



Lucerne University  
of Applied Sciences  
and Arts

# Perspectives on AI and Machine Learning

*Lecture Series in Artificial Intelligence + Machine Learning*

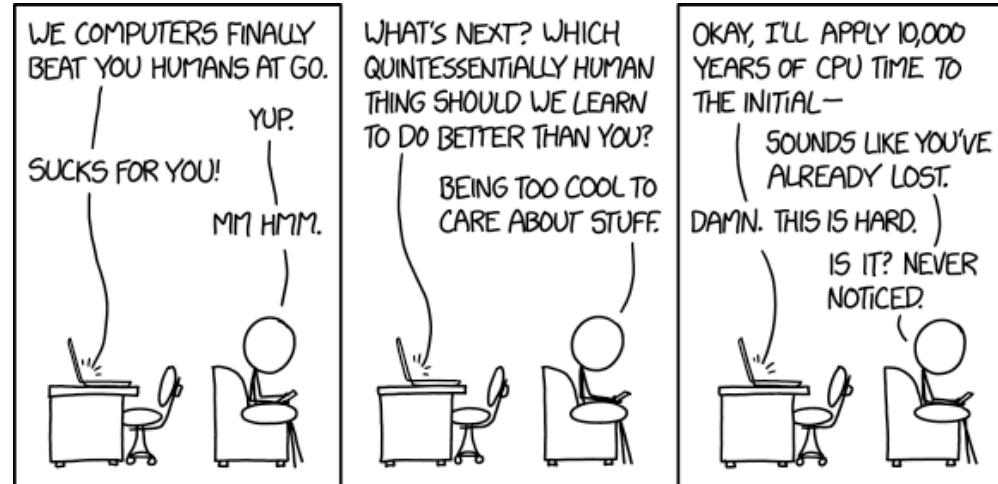
**Dr. Donnacha Daly**

Head of Bachelor Program in Artificial Intelligence & Machine Learning  
Member of the Algorithmic Business (ABIZ) Research Lab

[donnacha.daly@hslu.ch](mailto:donnacha.daly@hslu.ch) | [hslu.ch/bachelor-ai](http://hslu.ch/bachelor-ai) | [www.abiz.ch](http://www.abiz.ch)

# Topics Covered in Today's Lecture

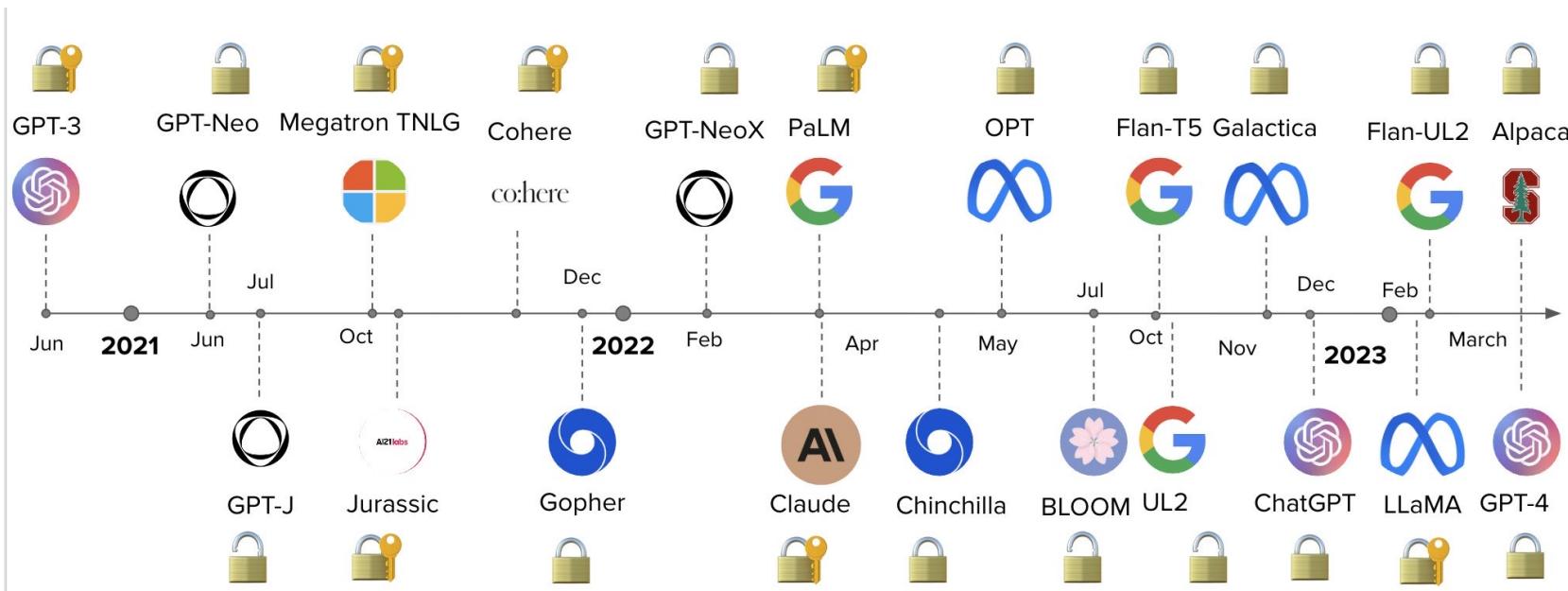
- A. Latest Developments in AI/ML
- B. Challenges & Risks in AI/ML
- C. The Future of AI/ML?



# PART A

## **Latest Developments in AI/ML**

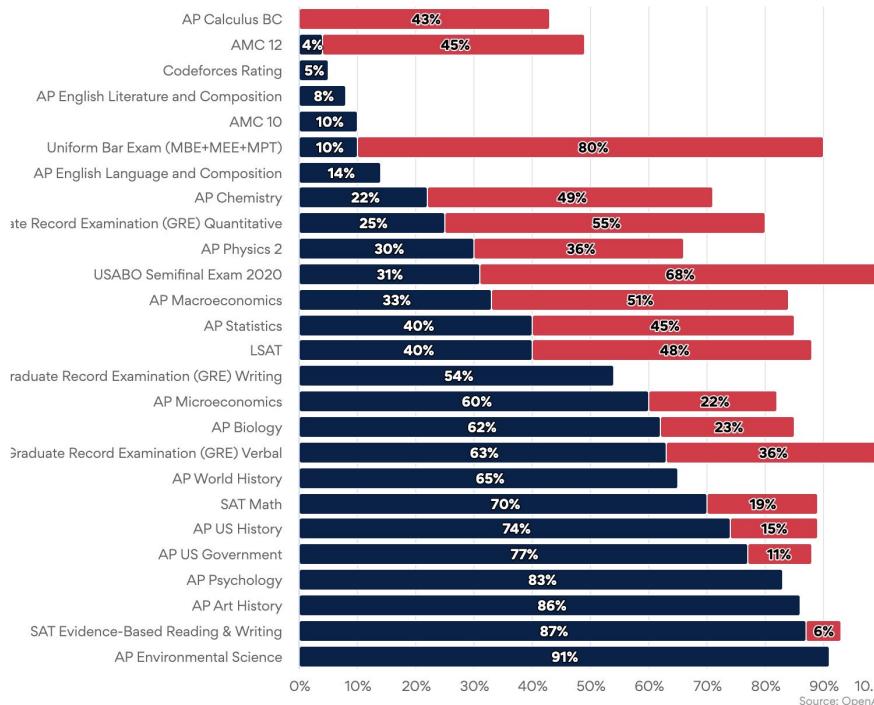
# Latest Developments in Language Synthesis



# Latest Developments in Language Synthesis

## Lower Bound Percentile Exam Results (Ordered By GPT-3.5 Performance)

■ GPT-3.5 ■ GPT-4



## HOW LONG IT TOOK TOP APPS TO HIT 100M MONTHLY USERS

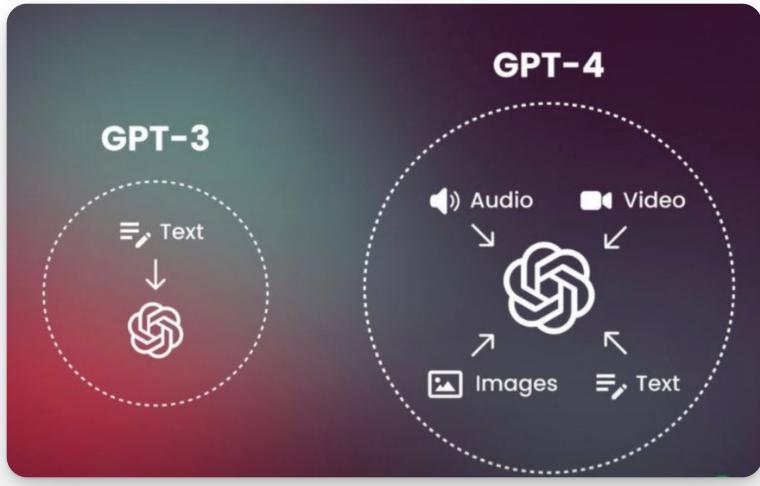
ChatGPT is estimated to have hit 100M users in January, 2 months after its launch.  
Here's how long it took other top apps to reach that:

APP	MONTHS TO REACH 100M GLOBAL MAUS
CHATGPT	2
TIKTOK	9
INSTAGRAM	30
PINTEREST	41
SPOTIFY	55
TELEGRAM	61
UBER	70
GOOGLE TRANSLATE	78

SOURCE: UBS



# Latest Developments in Language Synthesis



## Example of GPT-4 visual input:

User      What is funny about this image? Describe it panel by panel.



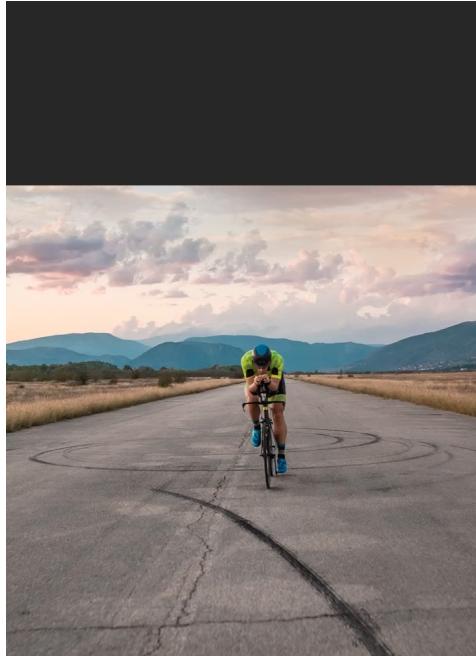
Source: <https://www.reddit.com/r/hmmm/comments/ubab5v/hmmm/>

The humor in this image comes from the absurdity of plugging a large, outdated VGA connector into a small, modern smartphone charging port.

# Latest Developments in Image Synthesis



# Latest Developments in Image Synthesis



Adobe ✨  
@Adobe

...

Dream bigger with us. ✨ Introducing Generative Fill in the [@Photoshop](#) (beta) app - a new magical way to create extraordinary imagery from a simple text prompt, powered by [#AdobeFirefly](#). Learn more: [adobe.ly/firefly](http://adobe.ly/firefly)

# Latest Developments in Video Synthesis



Pete ✅

@nonmayorpete

JUST IN: NVIDIA dropped new text-to-video research.

...

While still far from Hollywood quality, it's pretty damn impressive how fast this is moving.

"a storm trooper vacuuming a beach"



# Latest Developments in Music Synthesis

AI song featuring fake Drake and Weeknd vocals pulled from streaming services

The song, called Heart on My Sleeve, has been removed from TikTok, Spotify and YouTube for 'infringing content created with generative AI'



For real ... Drake (right) and the Weeknd performing in London in 2014. Photograph: Jeff Barclay/REX Shutterstock

A song featuring AI-generated vocals purporting to be Drake and the Weeknd has been pulled from streaming services by Universal Music Group (UMG) after going viral over the weekend. The label condemned the song, called Heart on My Sleeve, for "infringing content created with generative AI".

## Google makes its text-to-music AI public

Kyle Wiggers @kyle\_l\_wiggers 7:49 PM GMT+2 • May 10, 2023

Comment

A screenshot of the MusicLM AI interface. At the top, it says "Ambient, soft sounding music I can study to". Below that is a waveform visualization. In the center, it says "MusicLM" and "Describe a musical idea and hear it come to life with AI". At the bottom, there are two track controls labeled "Track 01" and "Track 02".

MusicLM  
Describe a musical idea and hear it come to life with AI

Ambient, soft sounding music I can study to

MusicLM

Describe a musical idea and hear it come to life with AI

Track 01

Track 02

Image Credits: Google

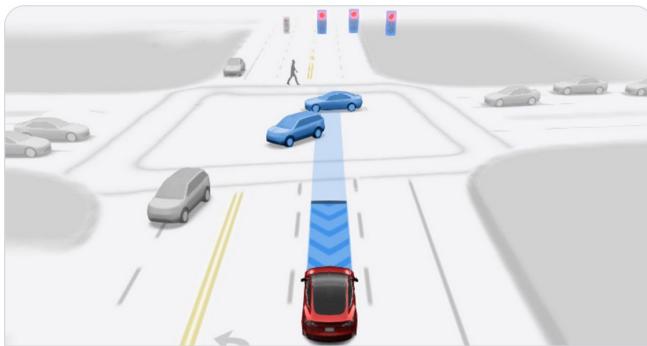
Google today [released](#) MusicLM, a new experimental AI tool that can turn text descriptions into music. Available in the AI Test Kitchen app on the web, Android or iOS, MusicLM lets users type in a prompt like "soulful jazz for a dinner party" or "create an industrial techno sound that is hypnotic" and have the tool create several versions of the song.

# Latest Developments in Autonomous Systems



Eva Fox 🦸 Claudio Nero's Legion 🚗 ✅ @EvaFoxU · May 25

Tesla has released FSD Beta in **Europe** and Australia for several vehicles. This move shows that the manufacturer is moving forward with its plans to roll out the feature worldwide



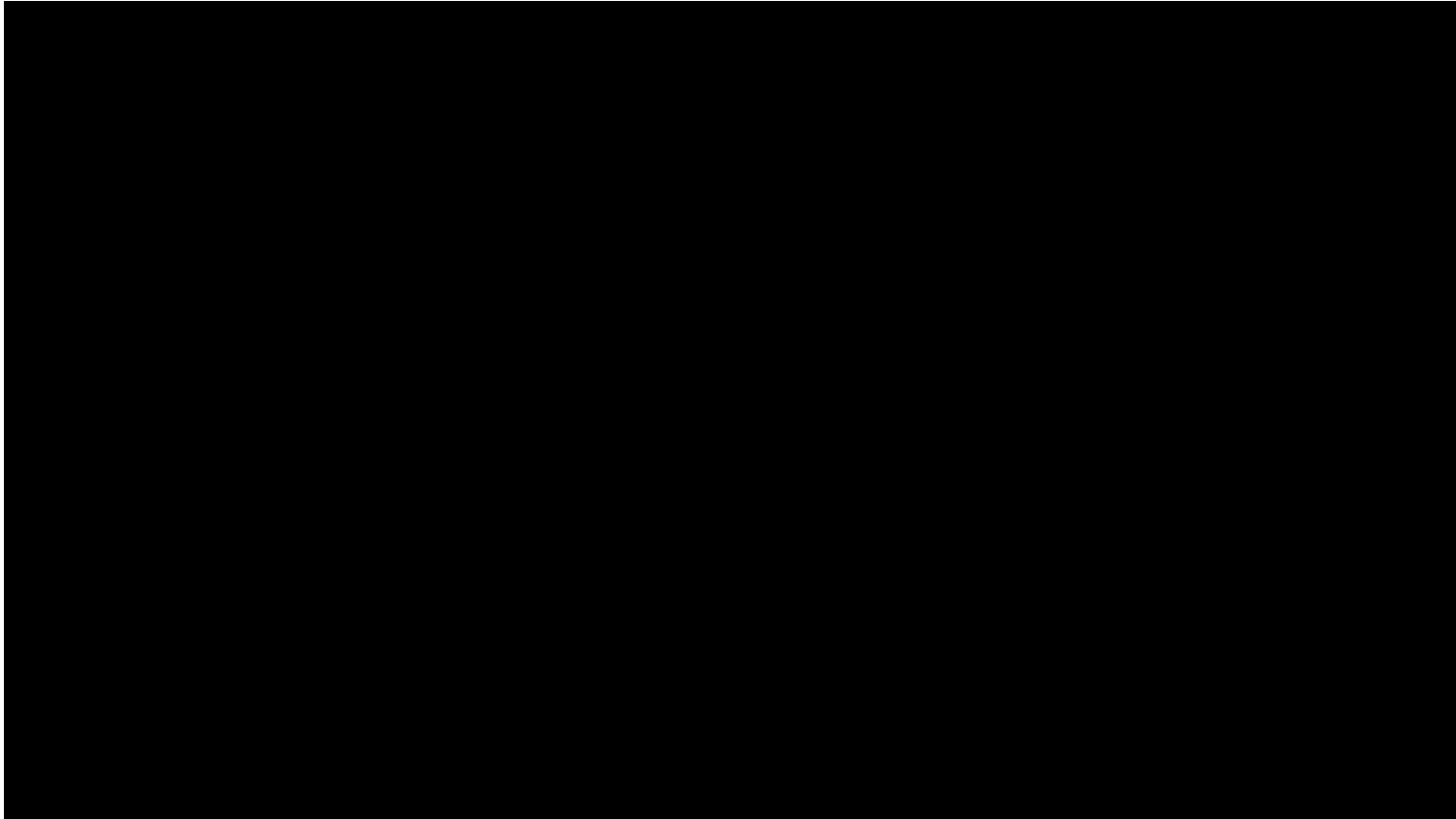
WHATCAR?

## Which car has the best self-driving tech?

Cars are doing more to assist their drivers than ever before in an effort to improve safety and comfort. We test 10 systems back to back to see how well they perform...

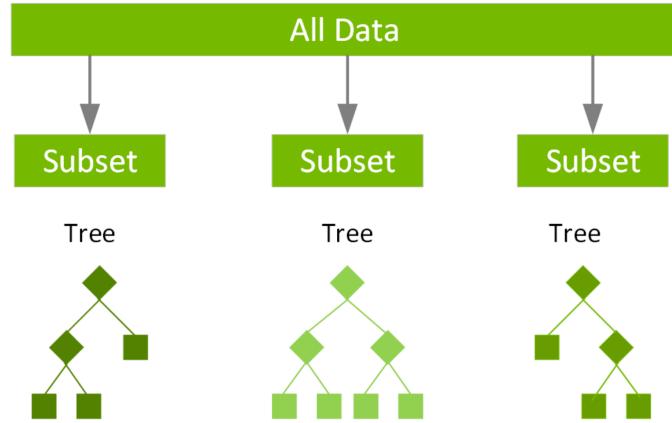
Car and ranking	Ease of use	S-bend test	Pothole test	30mph stop	42mph stop	Hands-off	Total
1. Tesla Model Y	5	5	3	Yes	Yes	5	20
2. Audi RS Q8	5	4	5	Yes	No	5	20
3. BMW iX3	5	3	5	Yes	No	5	19
4. Nissan Qashqai	4	4	4	Yes	No	5	18
5. Kia EV6	5	5	5	Yes	No	1	17
6. Ford Kuga	3	3	4	Yes	No	5	16
7. Volkswagen ID.5	2	3	5	No	No	5	15
8. Range Rover Sport	3	2	5	Yes	No	3	14
9. Volvo XC60	3	3	5	Yes	No	2	14
10. Toyota Yaris	3	1	5	Yes	No	1	11

# **Latest Developments in Autonomous Systems**



# Latest Developments in Data Science

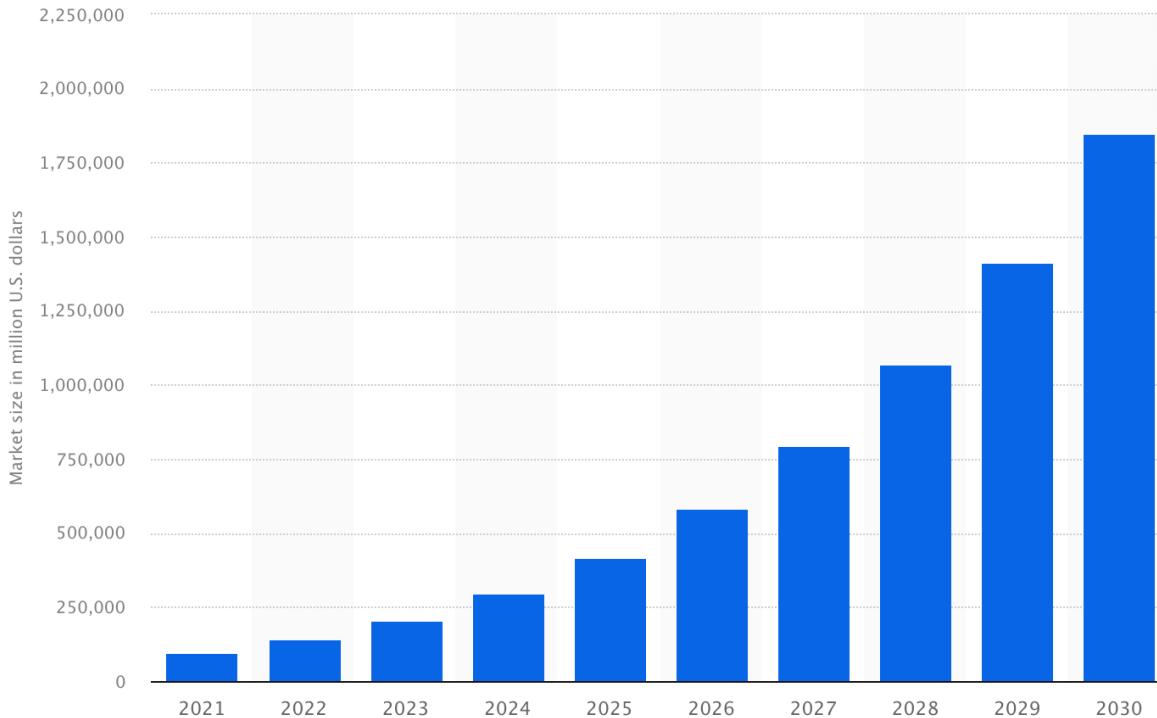
 **Towards Data Science**  @TDataScience · Mar 30 ...  
"Gradient-boosted decision trees (GBDTs) currently outperform deep learning in **tabular**-data problems, with popular implementations such as LightGBM, **XGBoost**, and CatBoost dominating Kaggle competitions."  
  
Read more from Diogo Leitão's post.  
  
  
[towardsdatascience.com](http://towardsdatascience.com)  
Gradient Boosting: To Early Stop or Not To Early Stop  
How early stopping halves training time for models like LightGBM, XGBoost and CatBoost.



## What is XGBoost?

**XGBoost**, which stands for Extreme Gradient Boosting, is a scalable, distributed **gradient-boosted** decision tree (GBDT) machine learning library. It provides parallel tree boosting and is the leading machine learning library for regression, classification, and ranking problems.

# Latest Developments in AI Investment



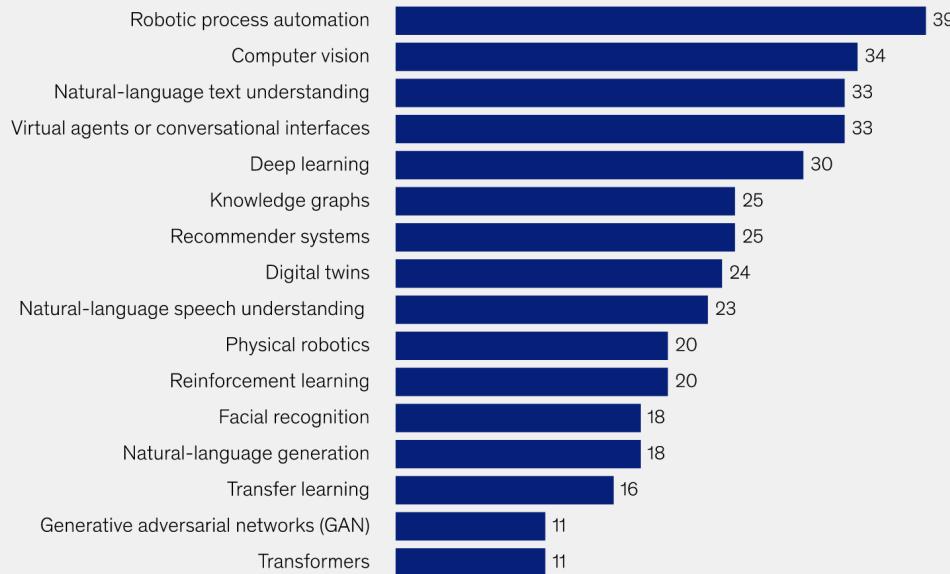
**Global artificial intelligence market size 2021-2030**  
(May 2023)

According to [Next Move Strategy Consulting](#) the market for artificial intelligence (AI) is expected to grow from nearly 100 billion U.S up to nearly two trillion U.S. dollars.

The AI market covers a vast amount of industries. Everything from supply chains, marketing, product making, research, analysis, and more are fields that will in some aspect adopt artificial intelligence within their business structures.

# Latest Developments in AI Investment

Percentage of respondents who say given AI capability is embedded in products or business processes in at least one function or business unit<sup>2</sup>



<sup>1</sup>The number of capabilities included in the survey has grown over time, from 9 in 2018 to 15 in the 2022 survey.

<sup>2</sup>Question was asked only of respondents who said their organizations have adopted AI in at least one function.

**This McKinsey AI survey** was conducted in the field from May 3 to May 27, 2022, and from August 15 to August 17, 2022, and garnered responses from 1,492 participants representing the full range of regions, industries, company sizes, functional specialties, and tenures. Of those respondents, 744 said their organizations had adopted AI in at least one function and were asked questions about their organizations' AI use.

# Latest Developments in AI Regulation



On Thursday 11 May, the leading parliamentary Committees of the European Parliament for the AI Act adopted their text (a provisional political deal reached by Parliament two weeks prior) by a large (84-7) majority. The plenary vote is now scheduled for mid-June. If Parliament votes in favour of the text, this will be the basis to enter the subsequent trilogue negotiations under the Spanish presidency with the Council and the Commission. A final compromise text is expected at the beginning of 2024.

## *Article 68c A right to explanation of individual decision-making*

1. *Any affected person subject to a decision which is taken by the deployer on the basis of the output from an high-risk AI system which produces legal effects or similarly significantly affects him or her in a way that they consider to adversely impact their health, safety, fundamental rights, socio-economic well-being or any other of the rights deriving from the obligations laid down in this Regulation, shall have the right to request from the deployer clear and meaningful explanation pursuant to Article 13(1) on the role of the AI system in the decision-making procedure, the main parameters of the decision taken and the related input data.*

# PART B

## Challenges & Risks in AI/ML

# The Hype Around AI



MIT Technology Review ✅ @techreview · Nov 26

"I do believe deep learning is going to be able to do everything, but I do think there's going to have to be quite a few conceptual breakthroughs."

...

## AI pioneer Geoff Hinton: “Deep learning is going to be able to do everything”

Thirty years ago, Hinton’s belief in neural networks was contrarian. Now it’s hard to find anyone who disagrees, he says.

By Karen Hao

November 3, 2020



NOAH BERGER / AP

# We are wrong about AI in many ways

- ✗ Narrow intelligence is on a continuum with general intelligence: **No!**
- ✗ Easy things are hard and hard things are easy (e.g. picking up a box v beating a grandmaster at chess): **No!**
- ✗ Machine learning resembles learning in humans (pursuit of a goal, understanding data): **No!**
- ✗ Intelligence is all in the brain (the body is not central to cognitive activities): **No!**

## Why AI is Harder Than We Think

Melanie Mitchell  
Santa Fe Institute  
Santa Fe, NM, USA

### Abstract

Since its beginning in the 1950s, the field of artificial intelligence has cycled several times between periods of optimistic predictions and massive investment (“AI spring”) and periods of disappointment, loss of confidence, and reduced funding (“AI winter”). Even with today’s seemingly fast pace of AI breakthroughs, the development of long-promised technologies such as self-driving cars, housekeeping robots, and conversational companions has turned out to be much harder than many people expected. One reason for these repeating cycles is our limited understanding of the nature and complexity of intelligence itself. In this paper I describe four fallacies in common assumptions made by AI researchers, which can lead to overconfident predictions about the field. I conclude by discussing the open questions spurred by these fallacies, including the age-old challenge of imbuing machines with humanlike common sense.



*Melanie Mitchell is a professor of computer science at Portland State University. She has worked at the Santa Fe Institute and Los Alamos National Laboratory. Her major work has been in the areas of analogical reasoning, complex systems, genetic algorithms and cellular automata.*

# AI Cannot be a “Brain in a Jar”



François Chollet ✅ @fchollet · Nov 28

Many deep learning researchers have this conception of intelligence as a kind of disembodied brain in a jar, acting on its environment in a one-sided fashion, trying to maximize some sort of reward score -- you could call it the "neocortex as RL agent" mindset

32

140

743



François Chollet ✅ @fchollet · Nov 28

In reality, intelligence is open-ended and embodied, embedded in an environment, in an ecosystem. In the case of humans, it's also embedded in a culture, and externalized as social and technological systems. Cognition cannot be understood in a fragmented manner

20

79

511



François Chollet ✅ @fchollet · Nov 28

The dominant philosophical current in AI is characterized by narrow-minded reductionism and ahistoricity -- ignorance of the thinking that came before (often, the "before" threshold is... 2015!)

8

39

326



# AI doesn't do "Common Sense"



AI & Machine Learning @ HSLU @hslu\_aiml · Nov 10

...

Erik Larson's new book, *The Myth of AI: Why Computers Can't Think the Way We Do*, discusses how widely publicized misconceptions about intelligence and inference have led AI research down narrow paths that are limiting innovation and scientific discoveries.

THE  
MYTH OF  
ARTIFICIAL  
INTELLIGENCE

*Why Computers Can't Think  
the Way We Do*

ERIK J. LARSON

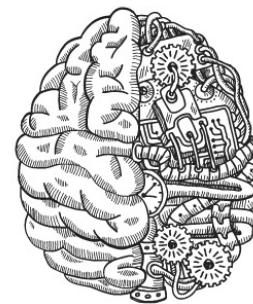
# We are far from Human-like AI



AI & Machine Learning @ HSLU @hslu\_aiml · Nov 18

"The kind of computation necessary for intelligence remains an open question; despite striking recent progress in AI, today's technologies provide nothing like the general-purpose, flexible intelligence that we have as humans." [mbm.cds.nyu.edu/#aboutPage](https://mbm.cds.nyu.edu/#aboutPage)

...



MINDS  
BRAINS &  
MACHINES

We believe that intensifying the dialog between these fields is needed for transformative research on understanding and engineering intelligence, focused on two key questions: How can advances in machine intelligence best advance our understanding of natural (human and animal) intelligence? And how can we best use insights from natural intelligence to develop new, more powerful machine intelligence technologies that more fruitfully interact with us?

# Generalization is Hard



Deleuze  
@Kukicat7

...

The morning in the Estonian capital began with a traffic jam of... robot couriers! Because of the snowfall, they stalled and could not move. Innovation doesn't seem to work in winter...

9:48 AM · Dec 2, 2021



# IEEE Spectrum



**Why Is AI  
So Dumb?**  
A SPECIAL REPORT

## Contents

October 2021



**The Turbulent Past  
and Uncertain  
Future of AI**

It's been boom-and-bust since the beginning.

By Eliza Strickland

**How Deep Learning  
Works**

Peek under the hood to see where the power comes from.

By Samuel K. Moore, David Schnieder & Eliza Strickland

**How to Train an  
All-Purpose Robot**

DeepMind takes on "catastrophic forgetting."

By Tom Chivers

**7 Revealing Ways  
AIs Fail**

We can learn much from AI failures.

By Charles Q. Choi

**A Human in the Loop**

AI's dirty little secret.

By Rodney Brooks

**Deep Learning's  
Diminishing Returns**

Improvement has a high price.  
By Nell C. Thompson, Kristjan Greenwald, Keeheon Lee & Gabriel F. Manso

**24**  
**The Great AI  
Reckoning**

**SPECIAL REPORT** Deep learning has built a brave new world—but now the cracks are showing.

**Deep Learning Goes  
to Boot Camp**

The Army explores deep learning's limits.

By Evan Ackerman

**AI EXPERTS SPEAK** The quotes scattered throughout this issue come from IEEE Spectrum's prior AI coverage. Go to [spectrum.ieee.org/aliquotes](http://spectrum.ieee.org/aliquotes) for links to the full articles.

26

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# Not just Dumb but Dangerous

The Verge @verge · Oct 14

They're putting guns on robot dogs now [theverge.com/2021/10/14/227](https://theverge.com/2021/10/14/227)



# Misuse of ML is Undermining Democracy

What we have discovered since 2016 is that the **micro-targeting** enabled by ML algorithms deployed by **social media companies** has weakened or undermined some of the institutions on which a functioning democracy depends.

It has, produced a polluted public sphere in which mis- and disinformation compete with more accurate news.

And it has created digital echo-chambers and led people to viral conspiracy theories such as Qanon and malicious content orchestrated by foreign powers and domestic ideologues.



# Lack of Diversity is a Real Problem

Heart icon Diversity in Artificial Intelligence @ EACL 2021 liked

Abeba Birhane  
@Abebab

...

Dear the ML/AI community,

DO NOT research autism without autistic people

DO NOT research disability without disabled people

DO NOT research race without people from historically marginalized races

DO NOT research gender without intersectional feminist theories

Thank you!

21:10 · 20.04.21 · Twitter Web App

## Google's new AI skincare tool may not work on patients with darker skin tones



# Training large deep-learning models is highly energy intensive

- In 2019 researchers at Uni. Amherst estimated that training one version a big language model, could **cost as much as \$3m.**
- Facebook's head of AI, says that one round of training for the biggest models can cost "millions of dollars" in **electricity consumption.**
- In 2020 an algorithm capable of learning, through trial and error, how to manipulate the pieces of a Rubik's Cube using a robotic hand consumed about **2.8 gigawatt-hours of electricity** in its training



# Regulation is Weak (so far...)



Ursula von der Leyen @vonderleyen · 2h ...

Artificial Intelligence is a fantastic opportunity for Europe.

And citizens deserve technologies they can trust.

Today we present new rules for trustworthy AI. They set high standards based on the different levels of risk.

**April 2021:** President of the European Commission announces new EU rules for the use of Artificial Intelligence

<https://hbr.org/2021/04/new-ai-regulations-are-coming-is-your-organization-ready>

## New AI Regulations Are Coming. Is Your Organization Ready?

by Andrew Burt

April 30, 2021

Harvard Business Review



Paul Taylor/Getty Images

**Summary.** In recent weeks, government bodies — including U.S. financial regulators, the U.S. Federal Trade Commission, and the European Commission — have announced guidelines or proposals for regulating artificial intelligence. Clearly, the regulation of AI is rapidly evolving. But rather than wait for more clarity on what laws and regulations will be implemented, companies can take actions now to prepare. That's because there are three trends emerging from governments' recent moves. [close](#)

# Some progress being made in AI-Reg



Melissa Heikkilä ✅ @Melissahei · Nov 24

BREAKING: The new German government backs a full ban on the use of biometric identification technologies such as facial recognition in public places.

...

## New German government to ban facial recognition and mass surveillance

By Oliver Noyan | EURACTIV.com

26 Nov 2021 (updated: 1 Dec 2021)



Germany's 'traffic light' coalition plans to ban biometric facial recognition and restrict the usage of mass surveillance tools, which marks a departure from the stance of the former government.

# Recommendations to Build Trust in AI/ML

“Building trust in AI systems is essential,

FINANCIAL TIMES

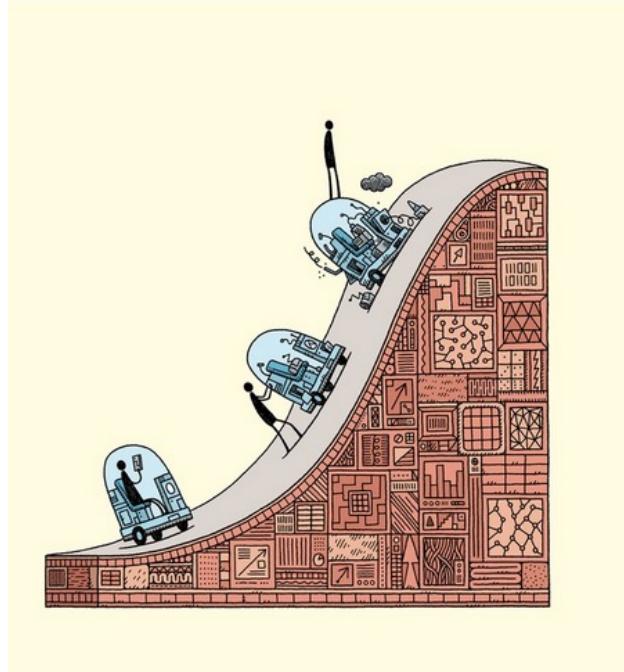
1. Teams that develop AI systems must be as diverse as possible to reduce the risk of bias.
2. Complex AI systems should never be deployed in any field unless they offer a demonstrable improvement on what already exists.
3. Algorithms that companies and governments deploy in sensitive areas such as healthcare, education, policing, justice and workplace monitoring should be subject to audit and comprehension by outside experts.

# The Limits of AI

For a more complete picture on the limitations of AI and Machine Learning please read:

**Economist  
Technology  
Quarterly**

June 2020



*Steeper than expected*

## Artificial intelligence and its limits

TECHNOLOGY QUARTERLY - JUN 13TH 2020

After years of hype, many people feel AI has failed to deliver, says Tim Cross

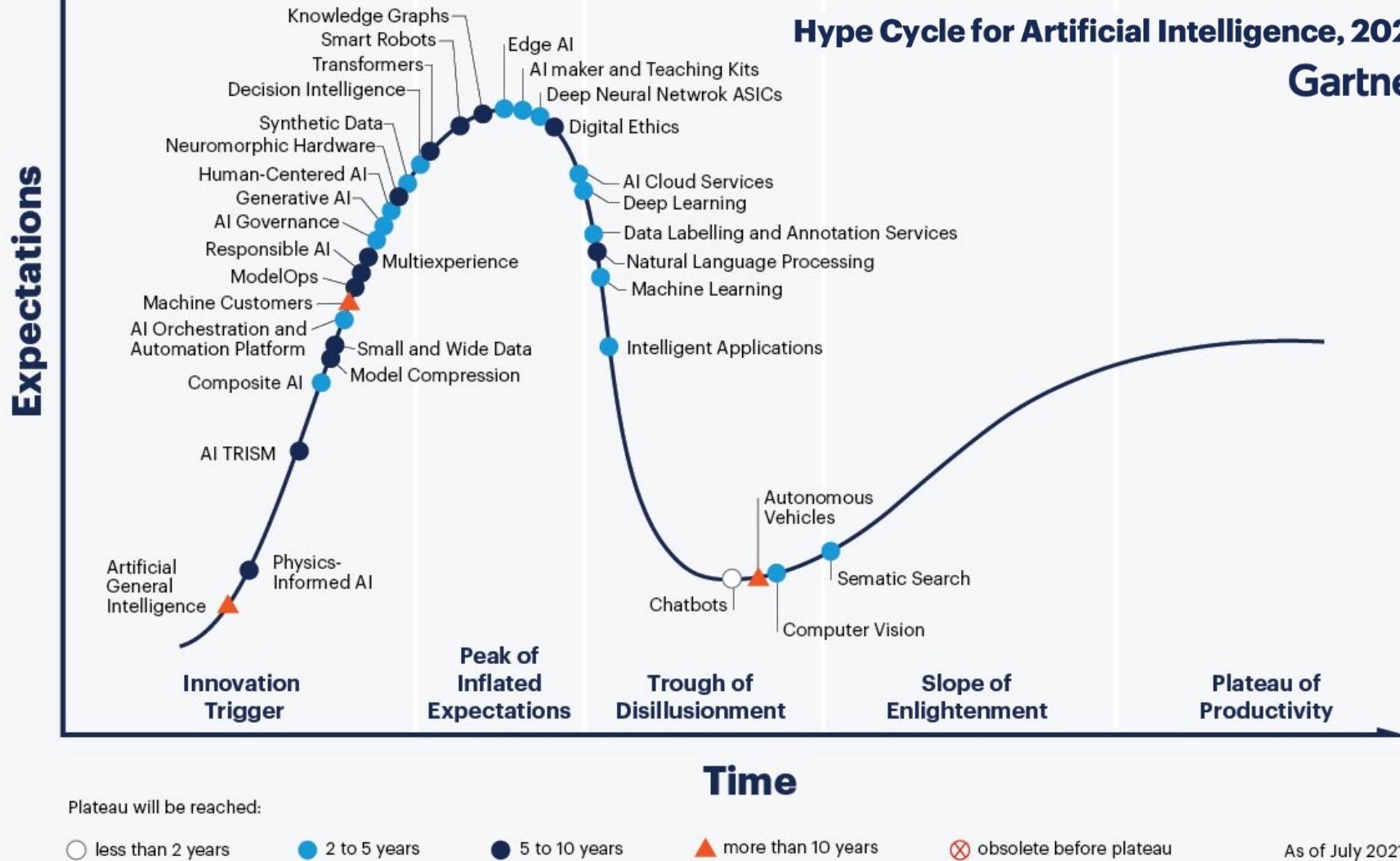
- Artificial intelligence and its limits: An understanding of AI's limitations is starting to sink in
- Data: For AI, data are harder to come by than you think
- The business world: Businesses are finding AI hard to adopt
- Brain scan: The potential and the pitfalls of medical AI
- Computing hardware: The cost of training machines is becoming a problem
- Automobiles: Driverless cars show the limits of today's AI
- The future: Humans will add to AI's limitations
- Acknowledgments

# PART C

## The Future of AI/ML

# Hype Cycle for Artificial Intelligence, 2021

Gartner



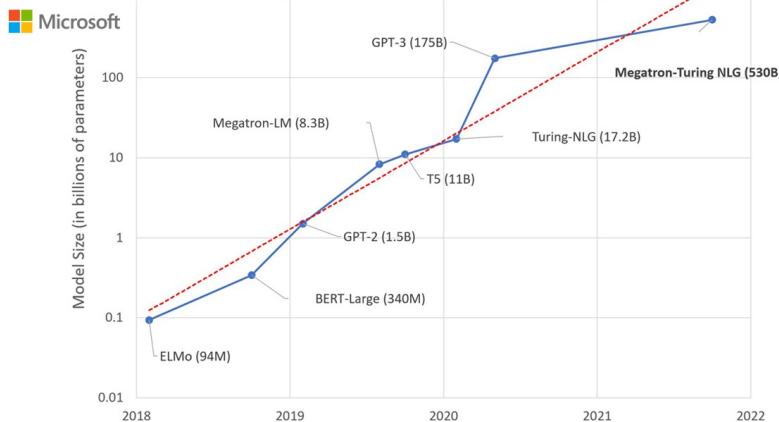
# Models are Getting Bigger



AI & Machine Learning @ HSLU @hslu\_aiml · Oct 15

"Nvidia and Microsoft announced their largest monolithic transformer language model to date, an AI model with a whopping 530 billion parameters they developed together, named the Megatron-Turing Natural Language Generation model."

...



The Register®



{\* AI + ML \*}

## Behold the Megatron: Microsoft and Nvidia build massive language processor

MT-NLG is a beast that fed on over 4,000 GPUs

Katyanna Quach

Tue 12 Oct 2021 // 00:36 UTC

23

MT-NLG was trained on a giant dataset known as [The Pile](#). Compiled by Eleuther AI, a group of AI researchers and engineers leading a grassroots effort to open-source large language models, it is made up of multiple smaller datasets totaling 825GB worth of text scraped off the internet from sources like Wikipedia, academic journal repositories, and news clippings.

# Custom Silicon for AI+Machine Learning

May 10, 2020, 03:48pm EDT | 19,942 views

## Artificial Intelligence Is Driving A Silicon Renaissance



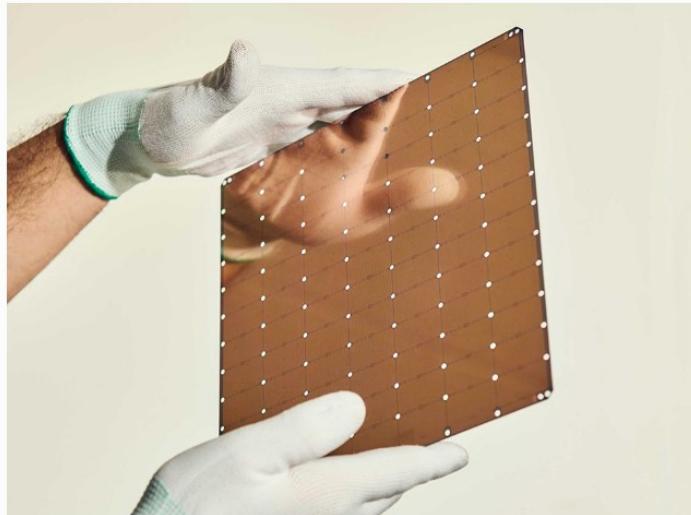
Rob Toews Contributor

AI

I write about the big picture of artificial intelligence.

In recent years, a new crop of entrepreneurs and technologists has set out to reimagine the computer chip, optimizing it from the ground up in order to unlock the potential of AI.

GPUs are not optimized for an AI workload. The GPU has been adopted by the AI community, but it was not born for AI. Purpose built Hardware is the next frontier.



Bay Area startup Cerebras Systems recently unveiled the largest computer chip in history, purpose-built for AI. [-] JESSICA CHOU, THE NEW YORK TIMES

# How to get even Bigger?



AI & Machine Learning @ HSLU @hslu\_aiml · Dec 1

...

Analog AI from IBM: 100 times faster than other commercially available AI Hardware. Nice idea originating from 2014 now realized!

$$f(\sum w_{ij} X_i)$$

## Ohm's Law ( $V = IR$ ) + Kirchhoff's Current Law ( $\sum I_{IN} = \sum I_{OUT}$ ) = Better AI

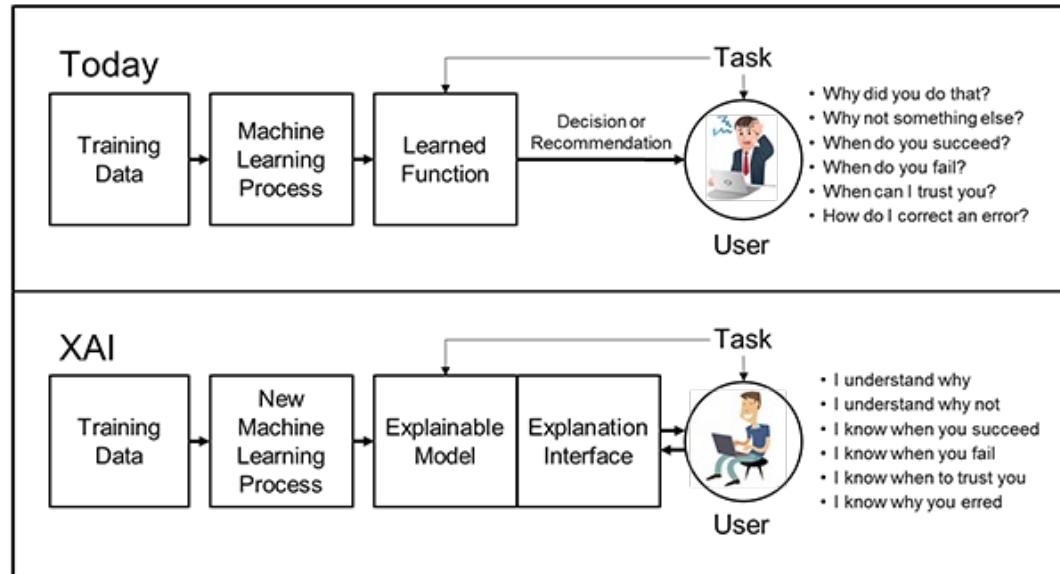
Neural-network processing done in memory with analog circuits will save energy

BY GEOFFREY W. BURR, ABU SEBASTIAN, TAKASHI ANDO & WILFRIED HAENSCH

We think changing from digital to analog computation might be what's needed. Using nonvolatile memory devices and two fundamental physical laws of electrical engineering, simple circuits can implement a version of deep learning's most basic calculations that requires mere thousandths of a trillionth of a joule (a femtojoule). There's a great deal of engineering to do before this tech can take on complex AIs, but we've already made great strides and mapped out a path forward.

# Explainable AI (XAI)

- Many ML models are **black boxes**
- We **cannot explain** the predictions they make
- This is often the single biggest **impediment** to ML use in sensitive areas such as legal or medical applications



If we can couple the power of models such as deep learning, with the interpretability of models like decision trees, AI will become fundamentally ubiquitous

# Data-Centric AI



Andrew Ng ✅ @AndrewYNg · 10h

...

Would love your feedback on this: AI Systems = Code (model/algorithm) + Data. Most academic benchmarks/competitions hold the Data fixed, and let teams work on the Code. Thinking of organizing something where we hold the Code fixed, and ask teams to work on the Data. (1/2)

62

171

1'501



Andrew Ng ✅ @AndrewYNg · 10h

...

Hoping this will more closely reflect ML application practice, and also spur innovative research on data-centric AI development. What do you think? (2/2)

60

25

548



10:12 pm · 24 May 2021 · Twitter Web App

<https://twitter.com/AndrewYNg/status/1396922136808202241>

## Big Data To Good Data: Andrew Ng Urges ML Community To Be More Data-Centric And Less Model-Centric



# Neuro-Symbolic AI

What happens when you combine neural networks and rule-based AI?

By Ben Dickson - June 5, 2019



The neuro-symbolic concept learner designed by the researchers at MIT and IBM combines elements of symbolic AI and deep learning. The idea is to build a strong AI model that can combine the reasoning power of rule-based software and the learning capabilities of neural networks.

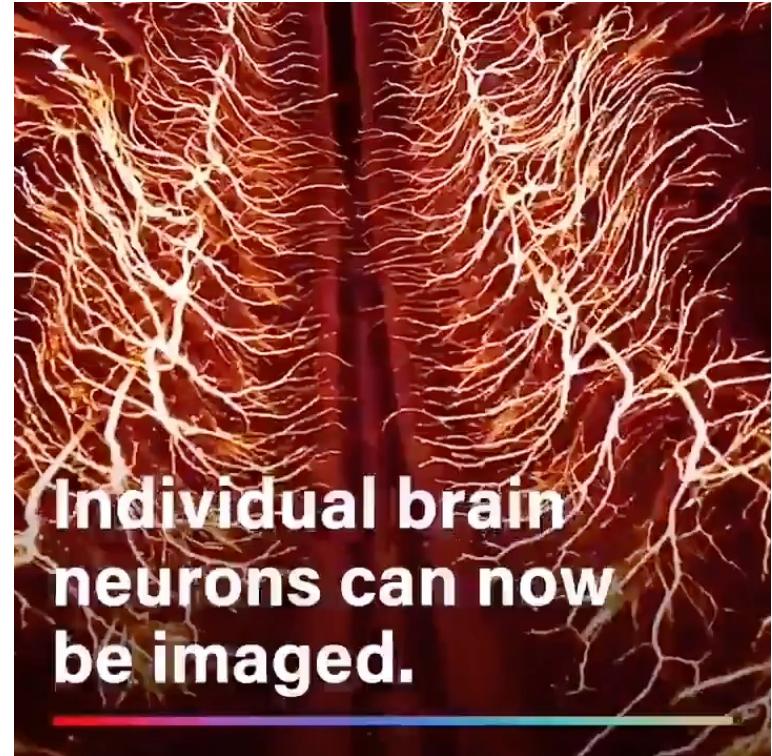
- For most of AI history, symbolism has been the dominant approach.
- But in the past decade, a revolution in neural networks has made deep learning the main workhorse.
- The key to the next AI breakthrough might hinge on combining symbolist AI with neural networks.

# Modelling the Brain



Jean-Baptiste Lefevre at #CES2022  
@jblefevre60

9:02 PM · Dec 6, 2021 · Twitter for Android



# Brain-Machine Interfaces

- Elon Musk launched Neuralink in 2016 with a half dozen researchers, professors and industry experts in 2016
- It will eventually implant a computer chip, roughly the size of a large coin, into the human brain via a robot surgeon.
- The chip, which Neuralink calls the “Link,” will wirelessly connect the brain to the digital world, starting by connecting to a smart phone.
- The resulting computing power, according to Musk, will allow humans to be broadly competitive with rapidly developing AI.

<https://www.cnbc.com/2020/12/05/elon-musks-neuralink-bold-ideas-hurdles.html>



April 9, 2021  
8:12 PM CEST

Technology

Elon Musk's Neuralink shows monkey with brain-chip playing videogame by thinking

# Artificial General Intelligence (AGI)

- **Narrow AI** is a specific type of artificial intelligence in which a technology outperforms humans in some very narrowly defined task (what we covered in this module)
- **Artificial general intelligence (AGI)**, or “strong AI,” allows a machine to apply knowledge and skills in different contexts. This more closely mirrors human intelligence by providing opportunities for autonomous learning and problem-solving



Narrow AI

Dedicated to assist with or take over specific tasks.



General AI

Takes knowledge from one domain, transfers to other domain.

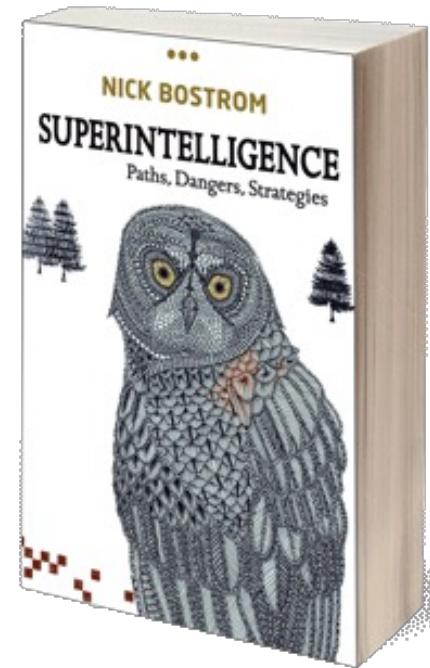


Super AI

Machines that are an order of magnitude smarter than humans.

# Superintelligence

- We don't know exactly when developments in AI will translate into **a machine that is generally intelligent** — able to compete with, or surpass, humans in all mental tasks, from composing sonatas to planning a war.
- But, fantastical as it seems, **nothing in science seems to forbid the creation of such a machine**. We know that blind evolutionary processes can produce human-level general intelligence, since they have already done so at least once.
- In other words, unless you believe that there is something magical (as opposed to merely fiendishly complicated) about how the brain works, the existence of humans is proof, in principle at least, that **intelligent machines can be built**.



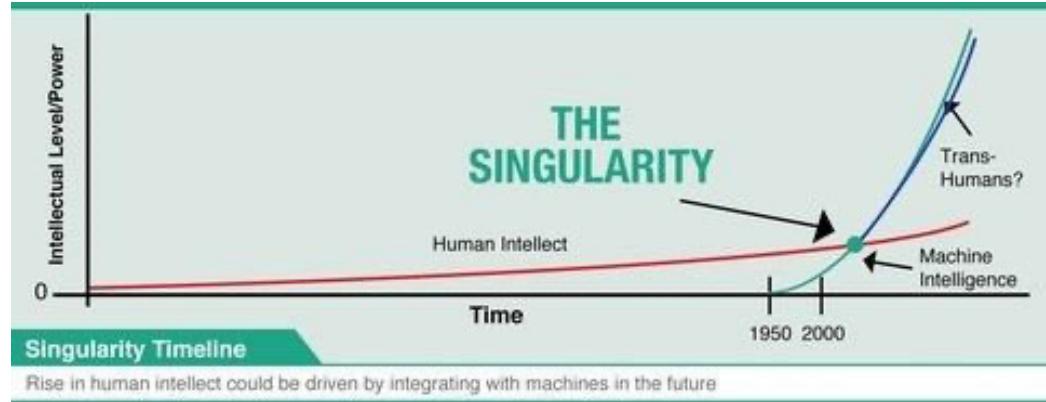
# How Will Human Level AI Emerge?

Yann LeCun @ylecun · 4h  
Five years later, I stand by these predictions.

Hasan Basri AKIRMAK · アキラ... · 7h  
Future of AI. Predictions from yr 2016. A retrospective.

- The emergence of human-level AI will not be an "event".
  - ▶ It will be progressive
- It will not happen in isolation
  - ▶ No single entity has a monopoly on good ideas
- Advancing AI is a scientific question right now, not a technological challenge
  - ▶ Formulating unsupervised learning is our biggest challenge
- Individual breakthroughs will be quickly reproduced
  - ▶ AI research is a world-wide community
- The majority of good ideas will come from Academia
  - ▶ Even if the most impressive applications come from industry
- It is important to distinguish intelligence from autonomy
  - ▶ Most intelligent systems will not be autonomous.

# The Singularity



Ray Kurzweil, a Director of Engineering at Google and pioneer of concepts related to the AI Singularity, forecasts that computers will have human level intelligence by 2029

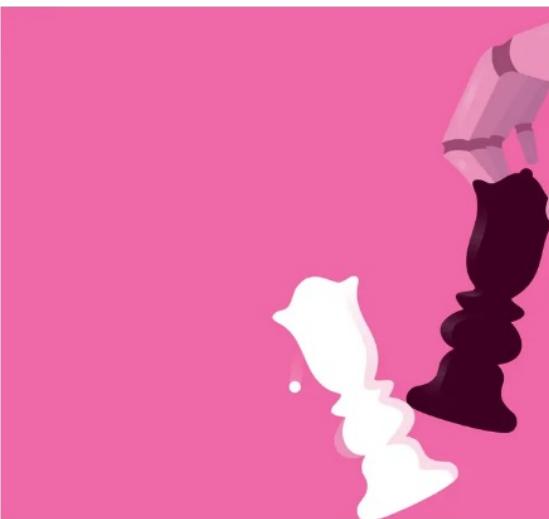
# What are the implications of AGI?



AI & Machine Learning @ HSLU @hslu\_aiml · Nov 29

...

"Philosopher Nick Bostrom, who heads the Future of Humanity Institute at Oxford, says that humans trying to build AI are "like children playing with a bomb", and that the prospect of machine sentience is a greater threat to humanity than global heating."



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# The Guardian

For 200 years

## The big idea: Should we worry about artificial intelligence?

Could AI turn on us, or is natural stupidity a greater threat to humanity?

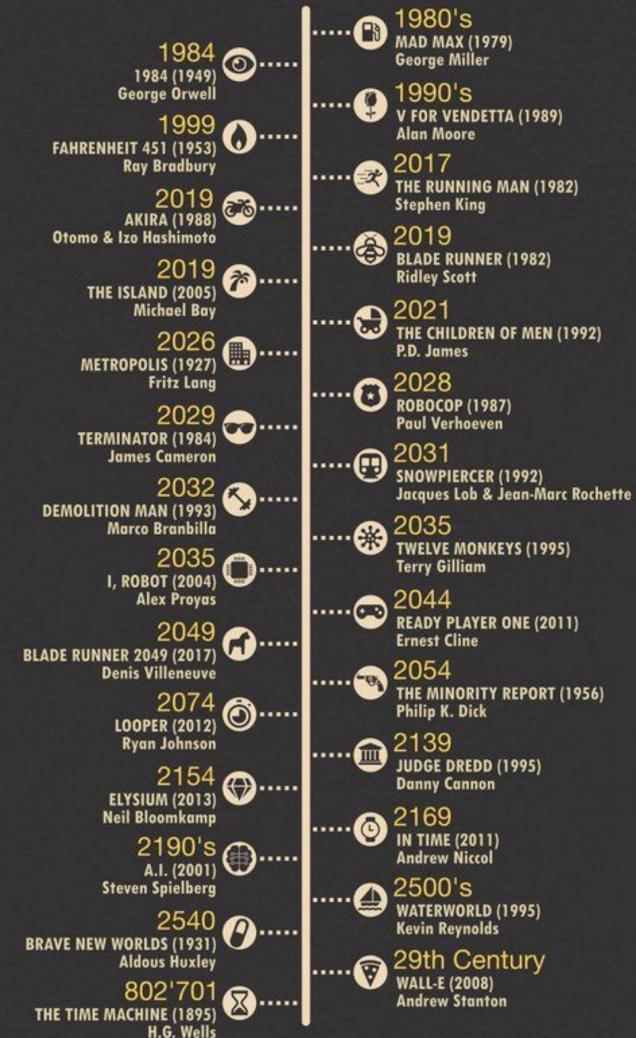
**E**ver since Garry Kasparov lost his second chess match against IBM's Deep Blue in 1997, the writing has been on the wall for humanity. Or so some like to think. Advances in artificial intelligence will lead - by some estimates, in only a few decades - to the development of superintelligent, sentient machines. Movies from The Terminator to The Matrix have portrayed this prospect as rather undesirable. But is this anything more than yet another sci-fi "Project Fear"?

Some confusion is caused by two very different uses of the phrase artificial intelligence. The first sense is, essentially, a marketing one: anything computer software does that seems clever or usefully responsive - like Siri - is said to use "AI". The second sense, from which the first borrows its glamour, points to a future that does not yet exist, of machines with superhuman intellects. That is sometimes called AGI, for artificial general intelligence.

# Thinking way into the Future!

- Humans are always thinking about what the far future will look like
- This is reflected in our culture, in literature, art, film and even music
- Specific to AI and Machine Learning, there are many films which imagine a future world where machines have intelligence
- Have you watched any of these? What do you think the future holds?

[https://www.reddit.com/r/movies/comments/c0nkqt/oca\\_selective\\_timeline\\_of\\_famous\\_dystopias/](https://www.reddit.com/r/movies/comments/c0nkqt/oca_selective_timeline_of_famous_dystopias/)



# A More Realistic Look at the Future of AI/ML

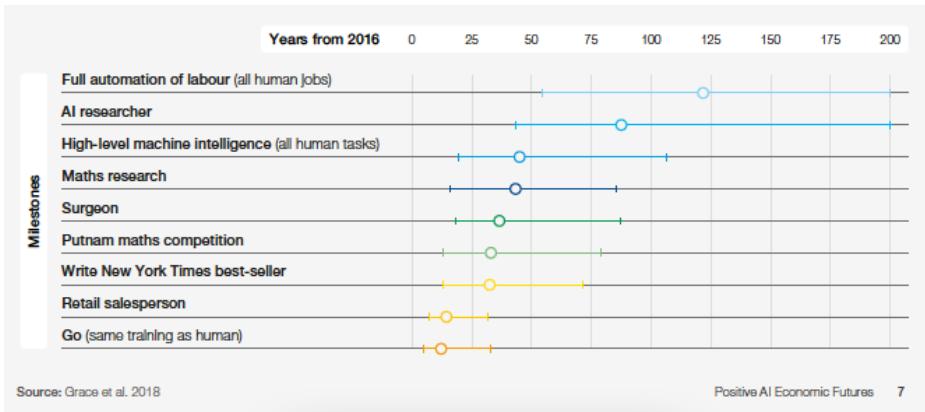


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The Global AI Council (GAIC) has run a series of workshops and interviews to gather possible positive visions and their implications for policy-makers. This report is a summary of views and aspirations which surfaced.

Time until machines outperform humans



In collaboration with the UC Berkeley Center for Human-Compatible AI and Roland Berger

## Positive AI Economic Futures

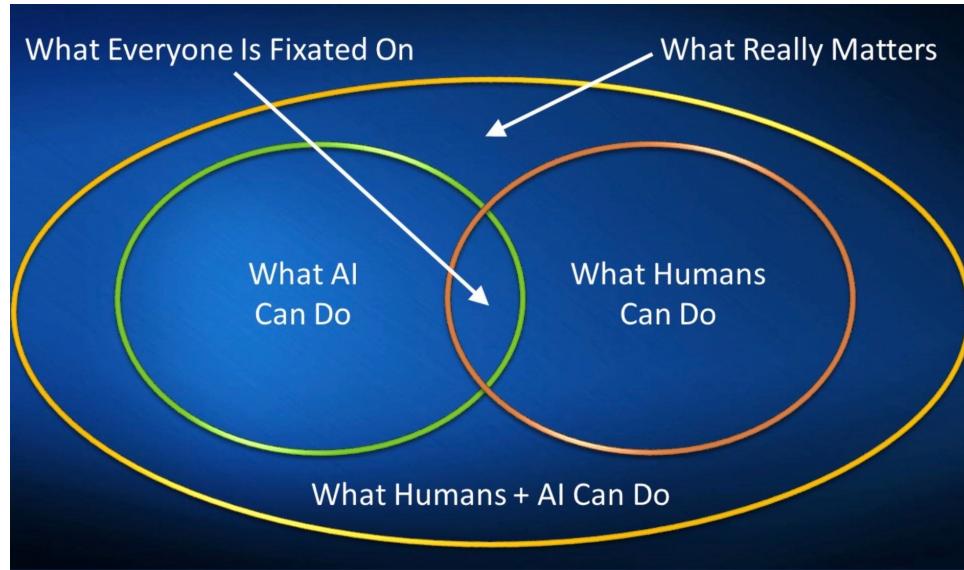
INSIGHT REPORT

NOVEMBER 2021



# Recap of Today's Lecture

- A. Latest Developments in AI/ML
- B. Challenges & Risks in AI/ML
- C. The Future of AI/ML?



# Thank You! Any Questions?



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