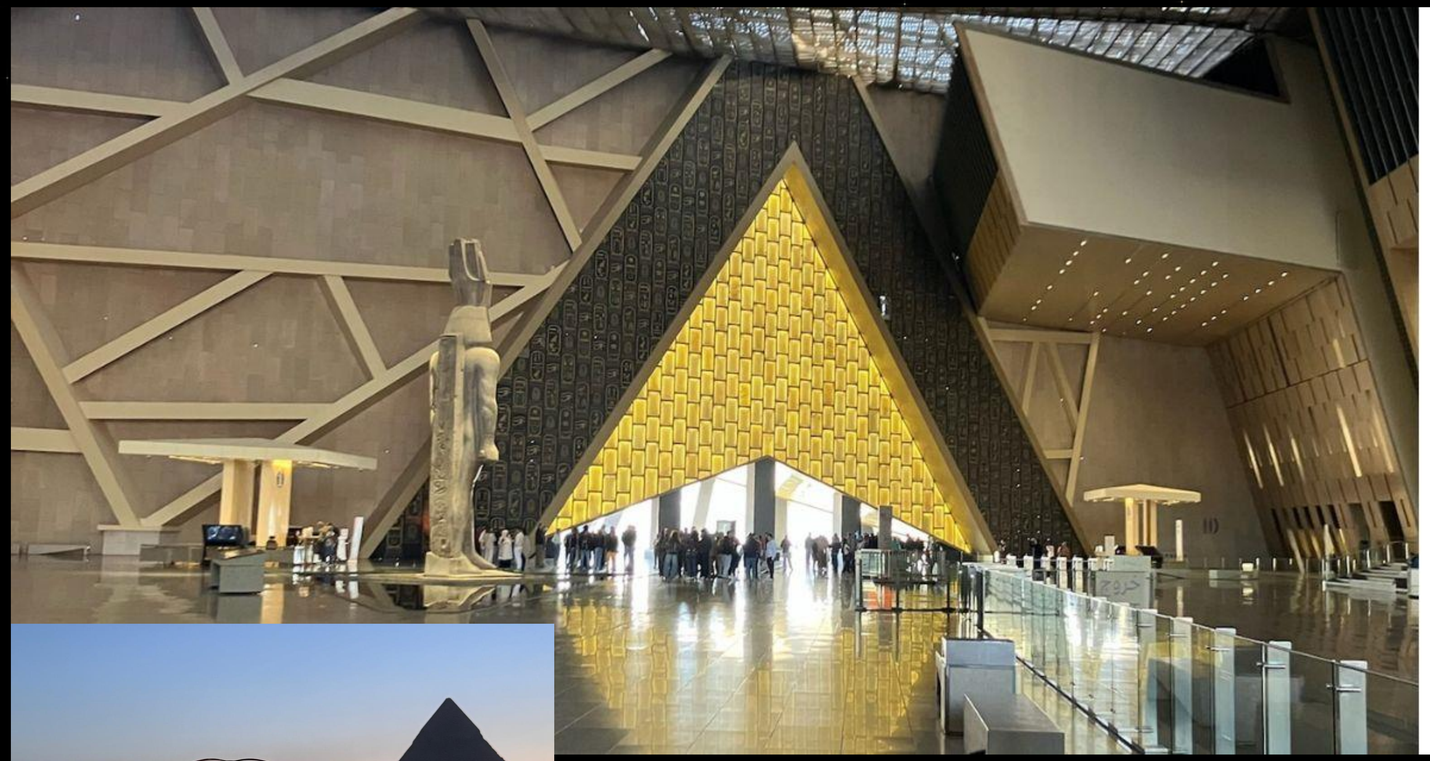
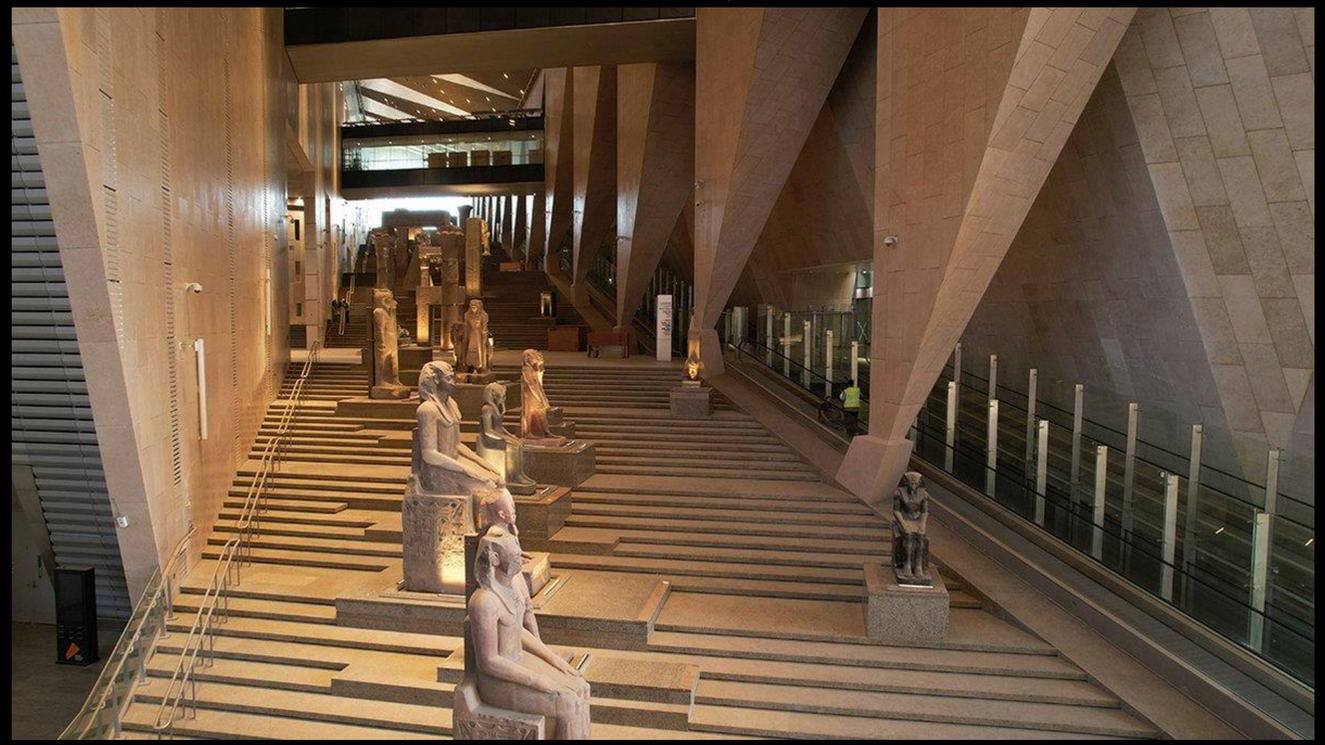
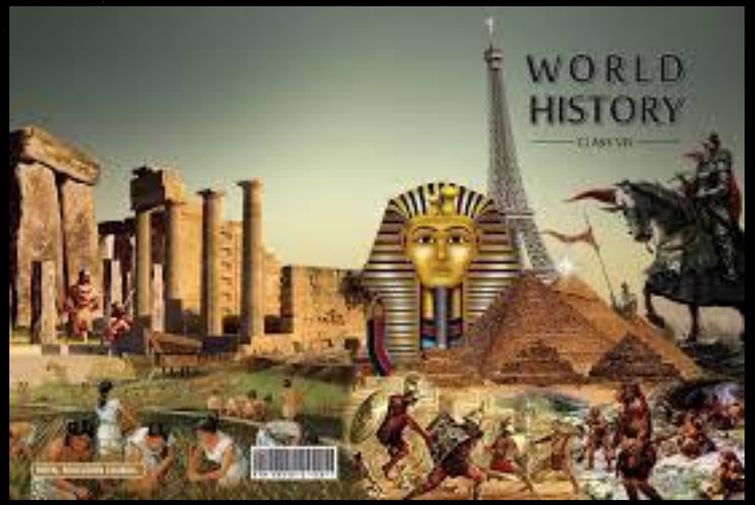
A Human-Centric Approach to AI Adaptation: Managing Constant Changes and Sustaining Growth

Prof (Dr) Simon See
Prof (Adjunct) Professor Coventry Univ, NTU
Distinguish Fellow, Fudan Uni
And Head of AI Technology Center, NVIDIA





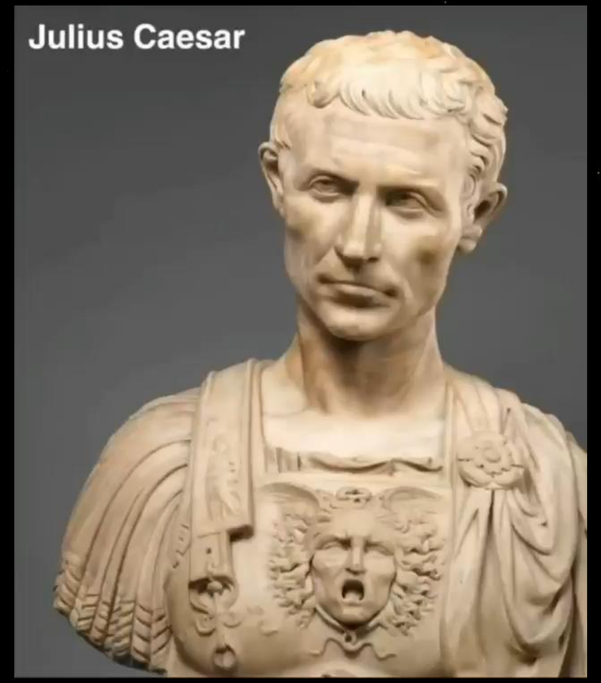

WORLD
HISTORY


William Tate


STAR TREK
RED ALERT!


3D Scan of Cheah Kongsi | Professor Eugene Ch'ng www.complexity.io

Archeology and Heritage Conservation



AI, Visual and Spatial Computing Technologies

Metaverse is the 3D Evolution of Computational History and Heritage

INITIATIVE

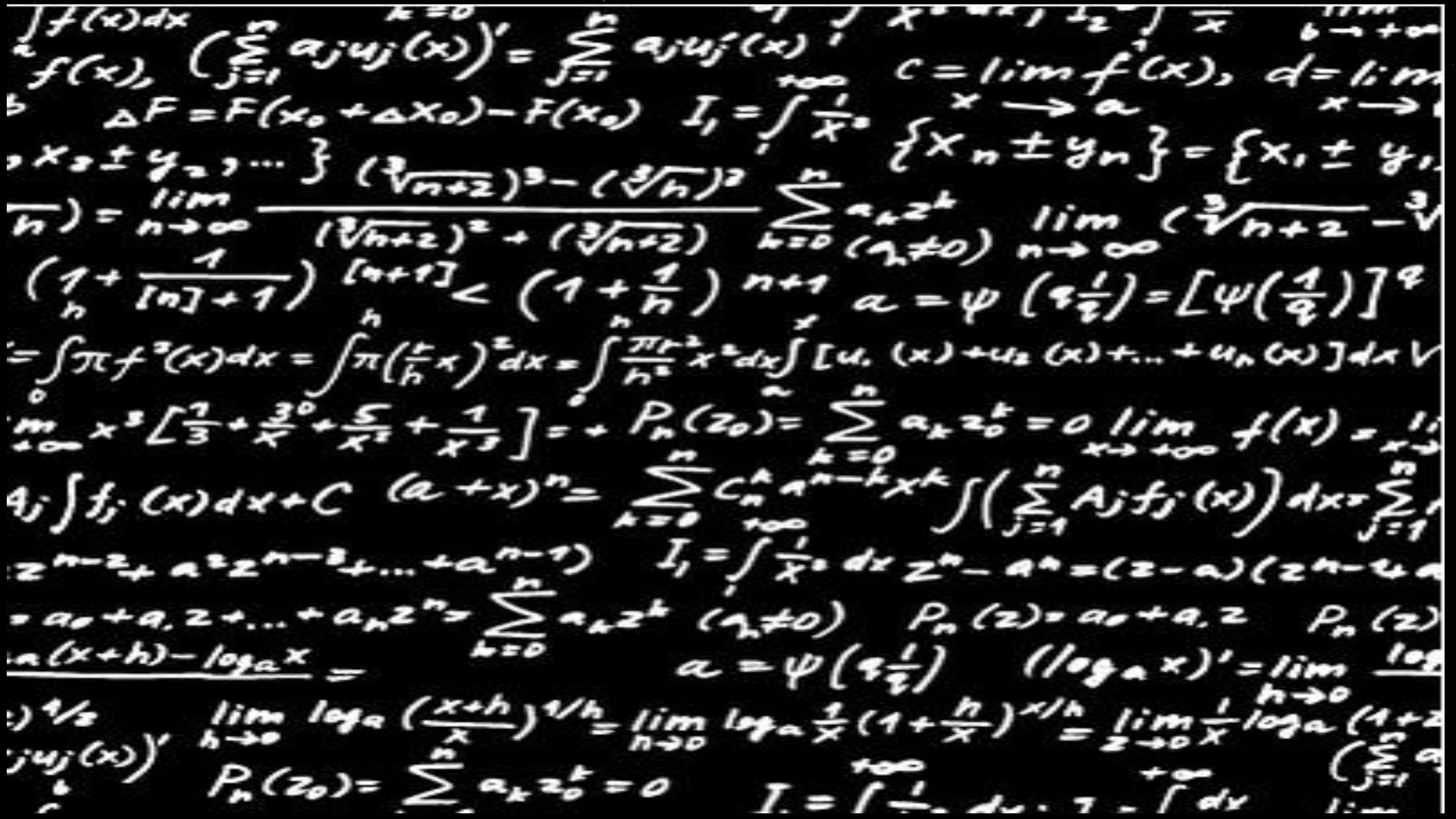
Create a world where History and Cultural Heritage are universally accessible and preserved through advanced digital technologies.

Comput. His. Herit. Initiative

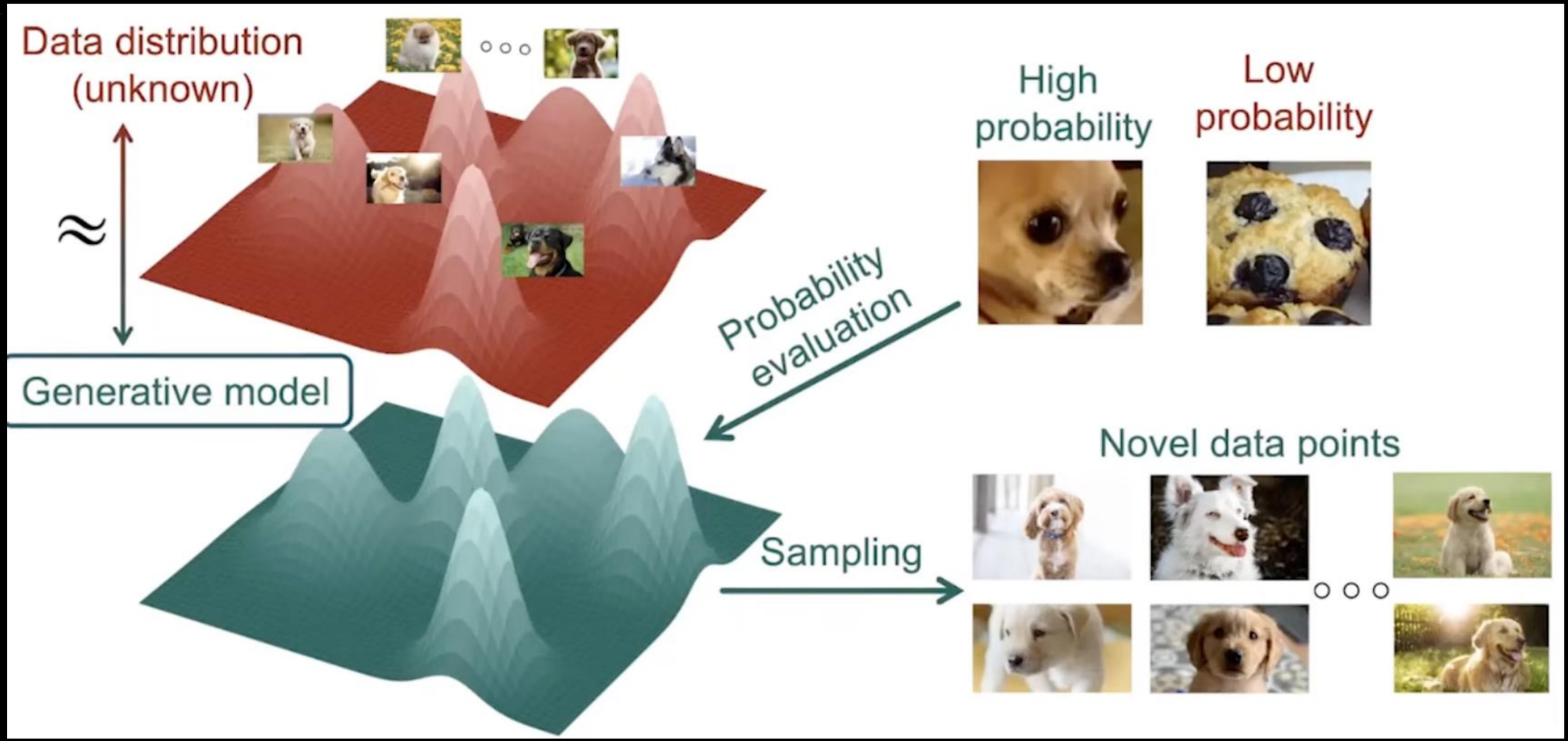
Missions:

- To **revolutionize** documentation, research, and sharing of art, culture, and heritage by harnessing the power of AI, Visual and Spatial Computing Technologies
- To **empower** communities globally, enhancing their ability to record, analyze, and share art and culture while fostering public engagement and education through innovative Digital Platforms
- To **foster** opportunities within the cultural creative industry for innovative Cultural Heritage-inspired Products and Services

3D Object Reconstruction from Video with NVIDIA NGP Instant NeRF

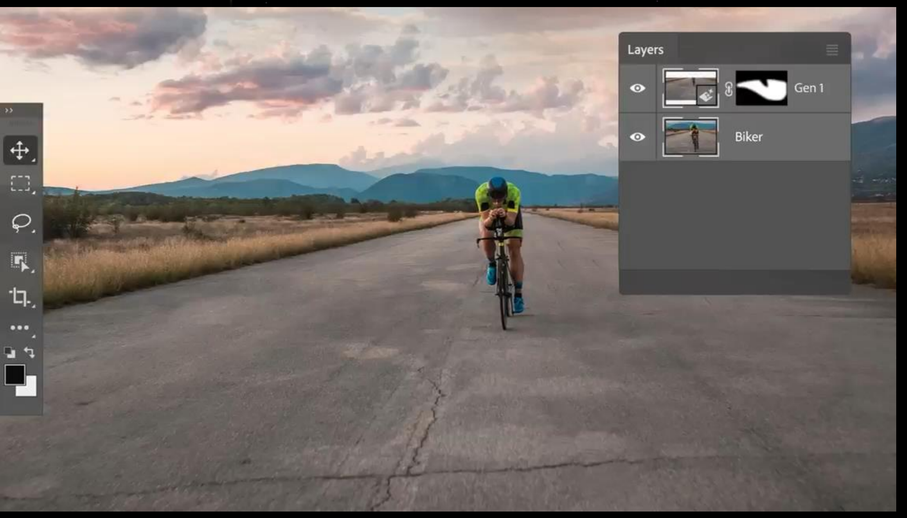


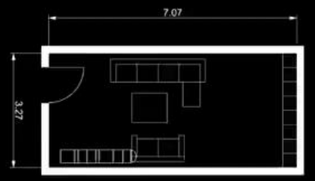
WHAT IS GENERATIVE AI?

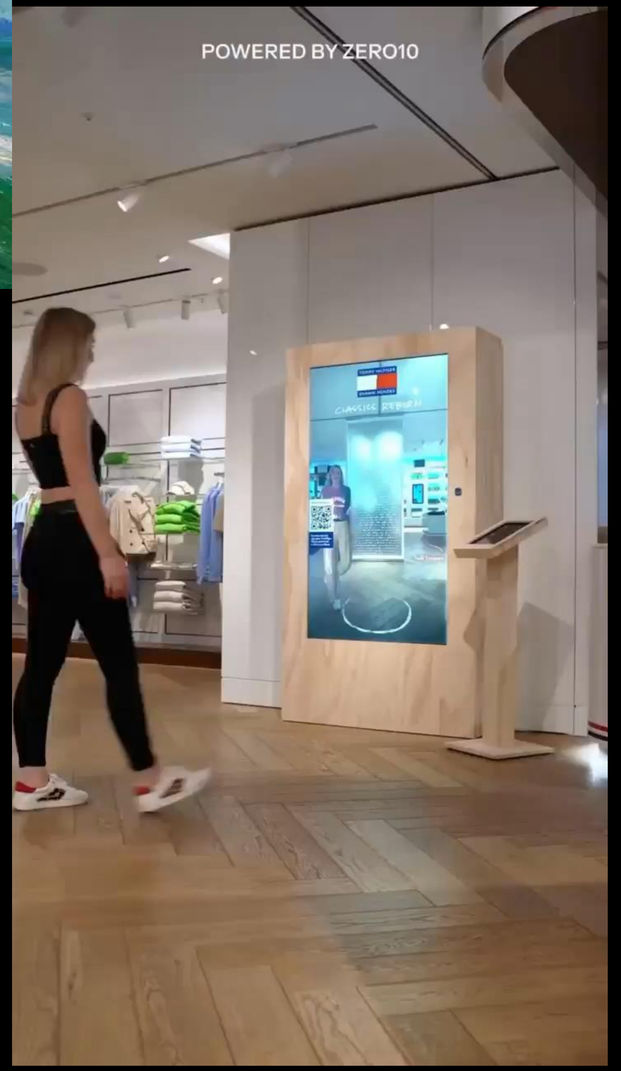


https://www.youtube.com/watch?v=wMmqCMwuM2Q&ab_channel=MITCBMM

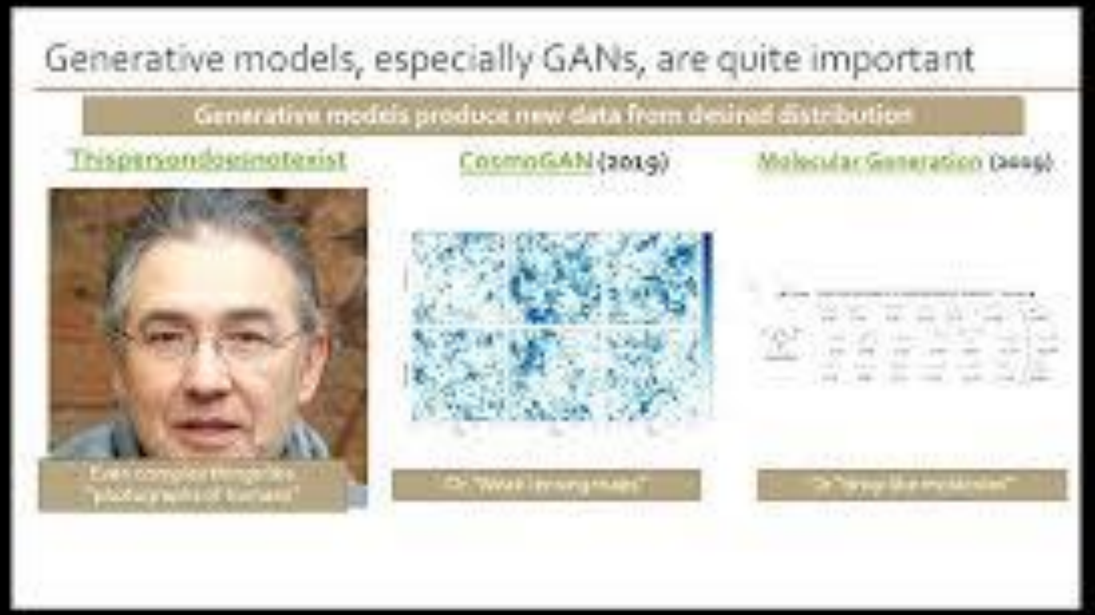
LEAP

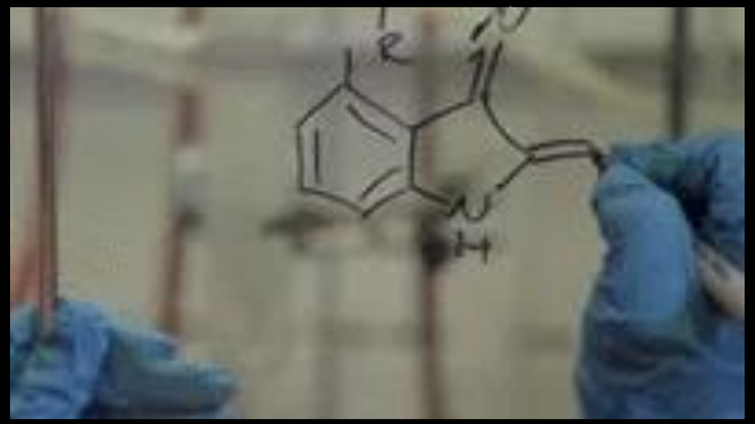

Layers
Gen 1
Biker

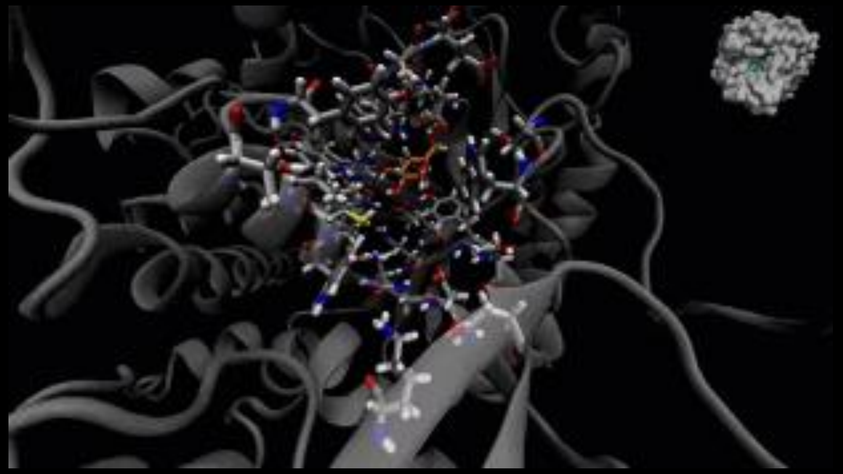

7.07
3.27

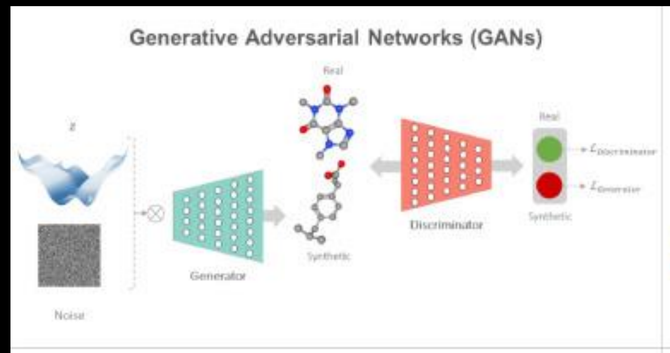

POWERED BY ZERO10

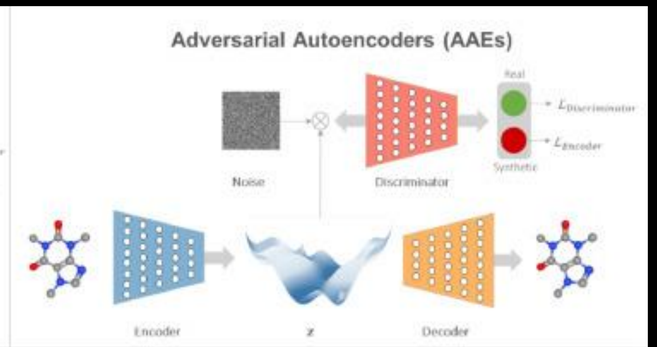
GENERATIVE AI

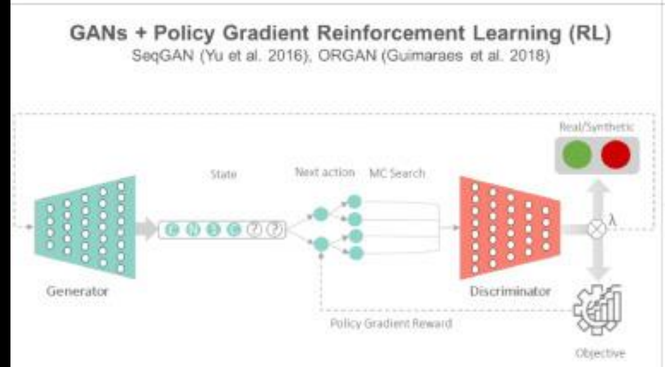


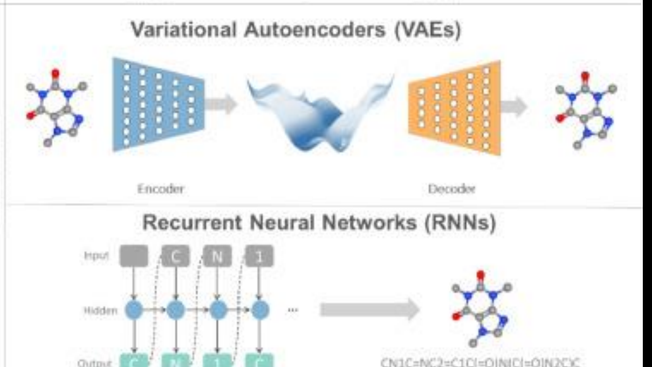


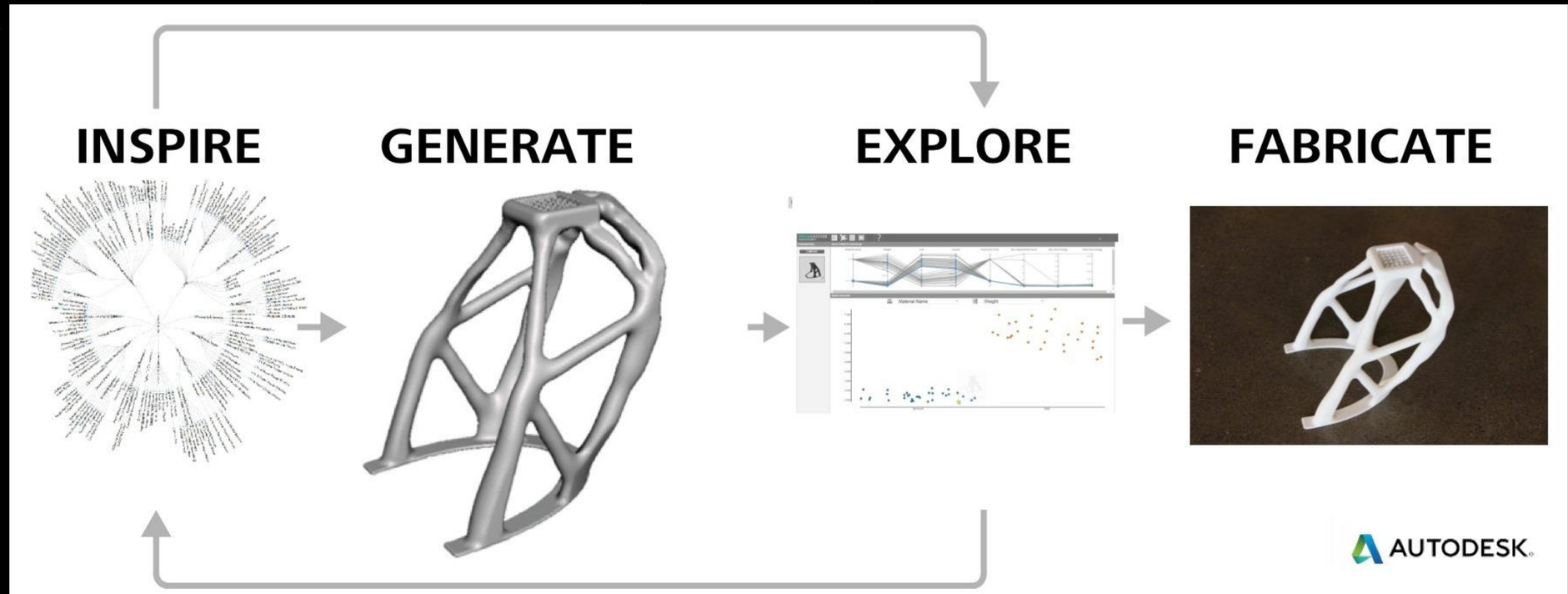


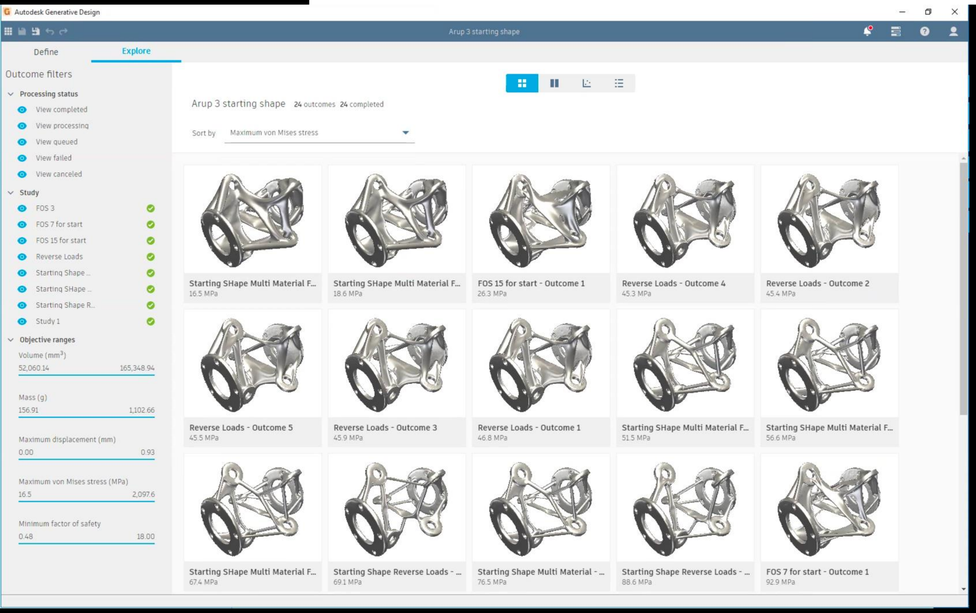


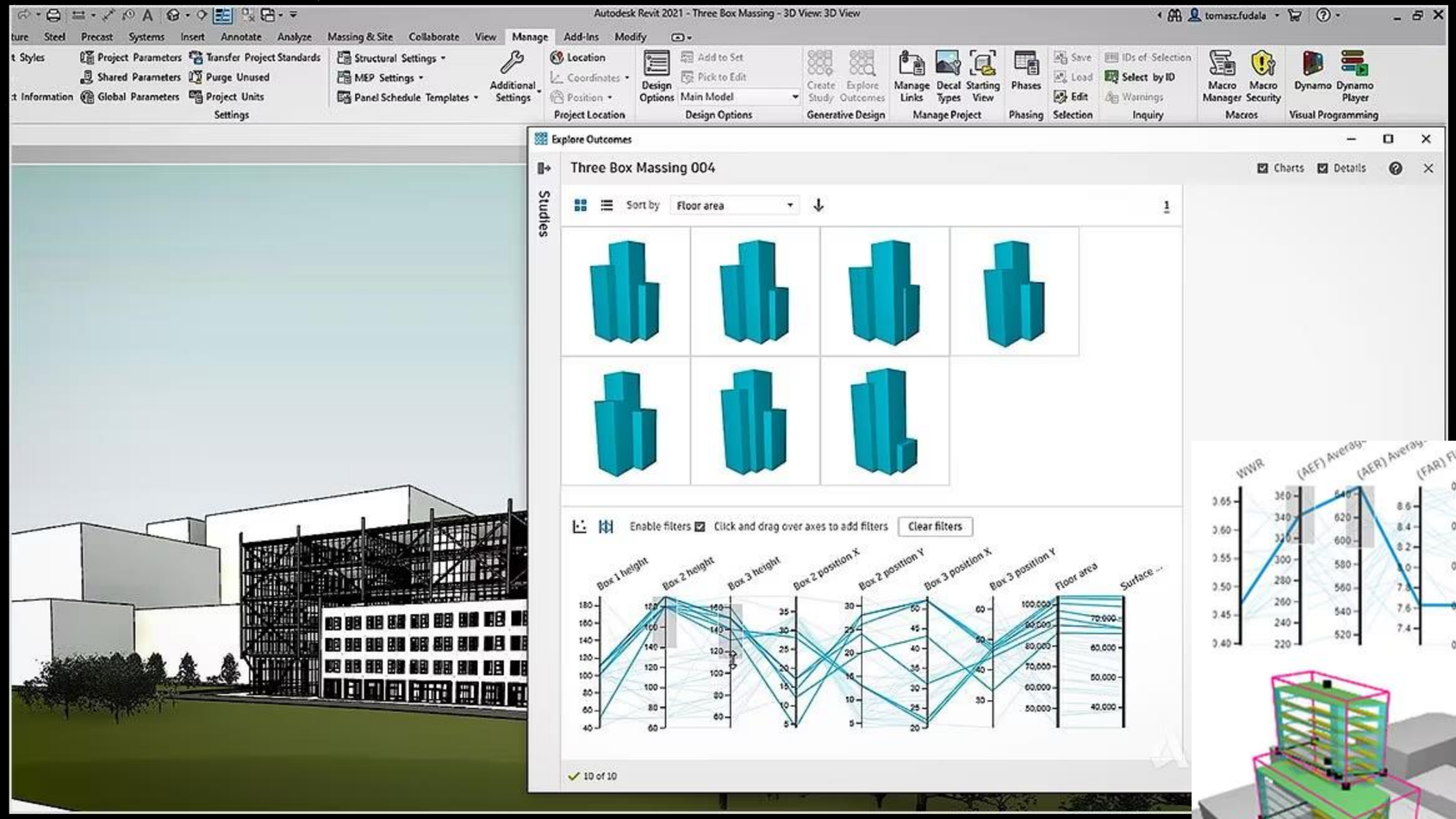


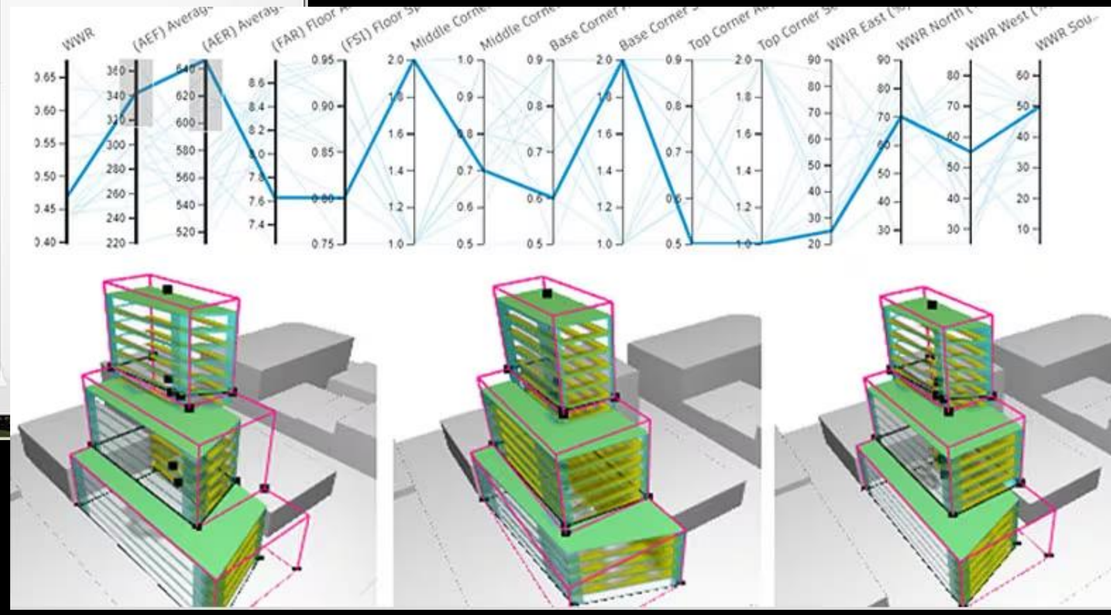





INSPIRE
GENERATE
EXPLORE
FABRICATE
AUTODESK.


Autodesk Generative Design
Arup 3 starting shape
Define
Explore
Outcome filters
Processing status
View completed
View processing
View queued
View failed
View canceled
Study
FOS 3
FOS 7 for start
FOS 15 for start
Reverse Loads
Starting Shape ...
Starting SHape ...
Starting Shape R...
Study 1
Objective ranges
Volume (mm³)
52,060.14
165,348.94
Mass (g)
156.91
1,102.66
Maximum displacement (mm)
0.00
0.93
Maximum von Mises stress (MPa)
16.5
2,097.6
Minimum factor of safety
0.48
18.00
Arup 3 starting shape 24 outcomes 24 completed
Sort by Maximum von Mises stress
Starting SHape Multi Material F... 16.5 MPa
Starting SHape Multi Material F... 18.6 MPa
FOS 15 for start - Outcome 1 26.3 MPa
Reverse Loads - Outcome 4 45.3 MPa
Reverse Loads - Outcome 2 45.4 MPa
Reverse Loads - Outcome 5 45.5 MPa
Reverse Loads - Outcome 3 45.9 MPa
Reverse Loads - Outcome 1 46.8 MPa
Starting SHape Multi Material F... 51.5 MPa
Starting SHape Multi Material F... 56.6 MPa
Starting SHape Multi Material F... 67.4 MPa
Starting Shape Reverse Loads - ... 69.1 MPa
Starting Shape Multi Material - ... 76.5 MPa
Starting Shape Reverse Loads - ... 88.6 MPa
FOS 7 for start - Outcome 1 92.9 MPa

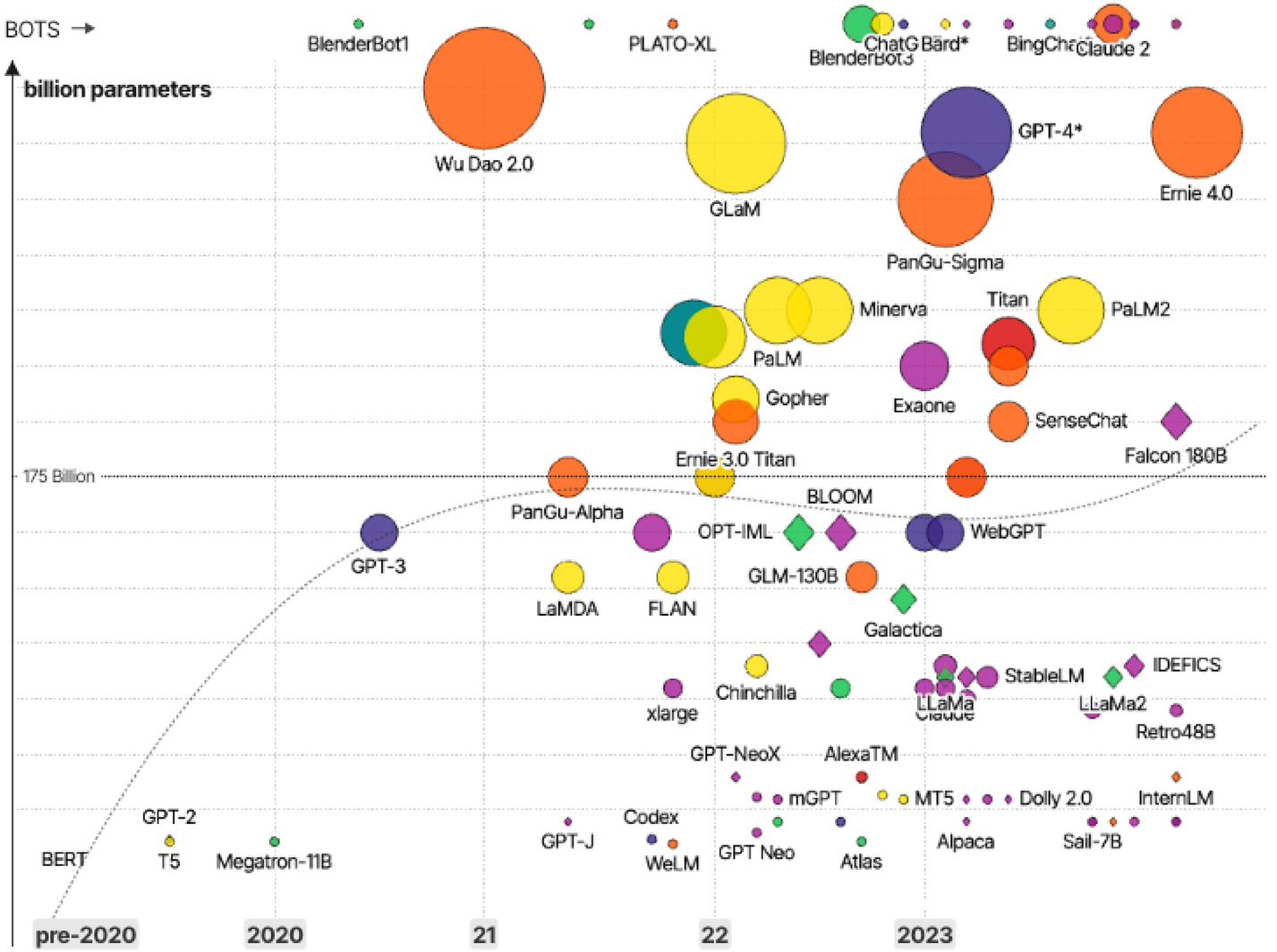

Autodesk Revit 2021 - Three Box Massing - 3D View: 3D View
tomasz.fudala
Steel
Precast
Systems
Insert
Annotate
Analyze
Massing & Site
Collaborate
View
Manage
Add-Ins
Modify
Project Parameters
Shared Parameters
Global Parameters
Transfer Project Standards
Purge Unused
Project Units
Settings
Structural Settings
MEP Settings
Panel Schedule Templates
Additional Settings
Location
Coordinates
Position
Project Location
Add to Set
Pick to Edit
Design Options
Main Model
Design Options
Create Study
Explore Outcomes
Generative Design
Manage Links
Decal Types
Starting View
Manage Project
Phases
Phasing
Save
Load
Edit
Selection
IDs of Selection
Select by ID
Warnings
Inquiry
Macro Manager
Macro Security
Macros
Dynamo
Dynamo Player
Visual Programming
Explore Outcomes
Three Box Massing 004
Charts
Details
Studies
Sort by
Floor area
Enable filters
Click and drag over axes to add filters
Clear filters
Box 1 height
Box 2 height
Box 3 height
Box 2 position X
Box 2 position Y
Box 3 position X
Box 3 position Y
Floor area
Surface ...
10 of 10


WWR
(AEF) Averag...
(AER) Averag...
(FAR) Floor ...
(FSI) Floor ...
Middle Corne...
Middle Corne...
Base Corner ...
Base Corner ...
Top Corner ...
Top Corner ...
WWR East (...
WWR North (...
WWR West (...
WWR Sou...

The Rise and Rise of A.I. Large Language Models (LLMs) & their associated bots like ChatGPT

size = no. of parameters open-access

Amazon-owned Chinese Google Meta / Facebook Microsoft OpenAI Other



David McCandless, Tom Evans, Paul Barton
Information is Beautiful // UPDATED 2nd Nov 23

source: news reports, LifeArchitect.ai
* = parameters undisclosed // see the data

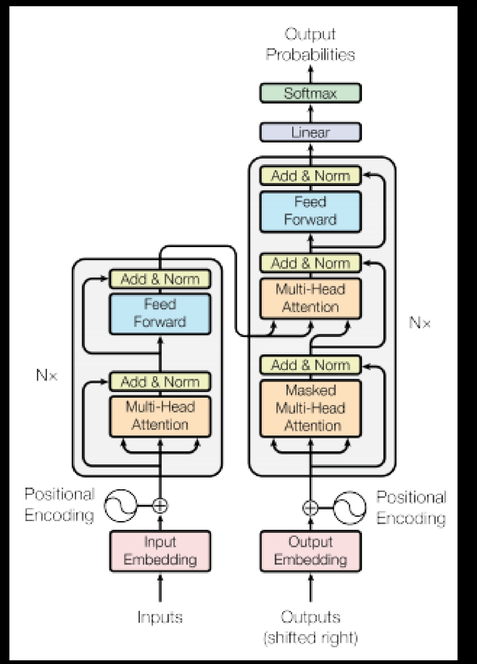
The

$$P_\theta(x) = \prod_{t=2}^{T} P_\theta(x_t \mid \{x_{<t}\})$$

$$= P_{\theta_2}(x_2 \mid \{x_1\}) P_{\theta_3}(x_3 \mid \{x_1, x_2\}) \cdots P_{\theta_T}(x_T \mid \{x_1, \cdots, x_{T-1}\})$$

$0 \leftarrow \{\bullet\}$ $\quad$ $0 \leftarrow \{\bullet\ \bullet\}$ $\quad$ $0 \leftarrow \{\bullet\ \cdots\ \bullet\}$

$x_2\ x_1$ $\quad$ $x_3\ x_1\ x_2$ $\quad$ $x_T\ x_1\ x_{T-1}$



$$PP(W) = P(w_1 w_2 \ldots w_N)^{-\frac{1}{N}}$$

$$= \sqrt[N]{\frac{1}{P(w_1 w_2 \ldots w_N)}}$$

equivalently:

$$PP(W) = 2^{-l}$$

where $l = \frac{1}{N} \log P(w_1 w_2 \ldots w_N)$

$$2^{-l} \text{ where } l = \frac{1}{M} \sum_{i=1}^{m} \log p(s_i)$$

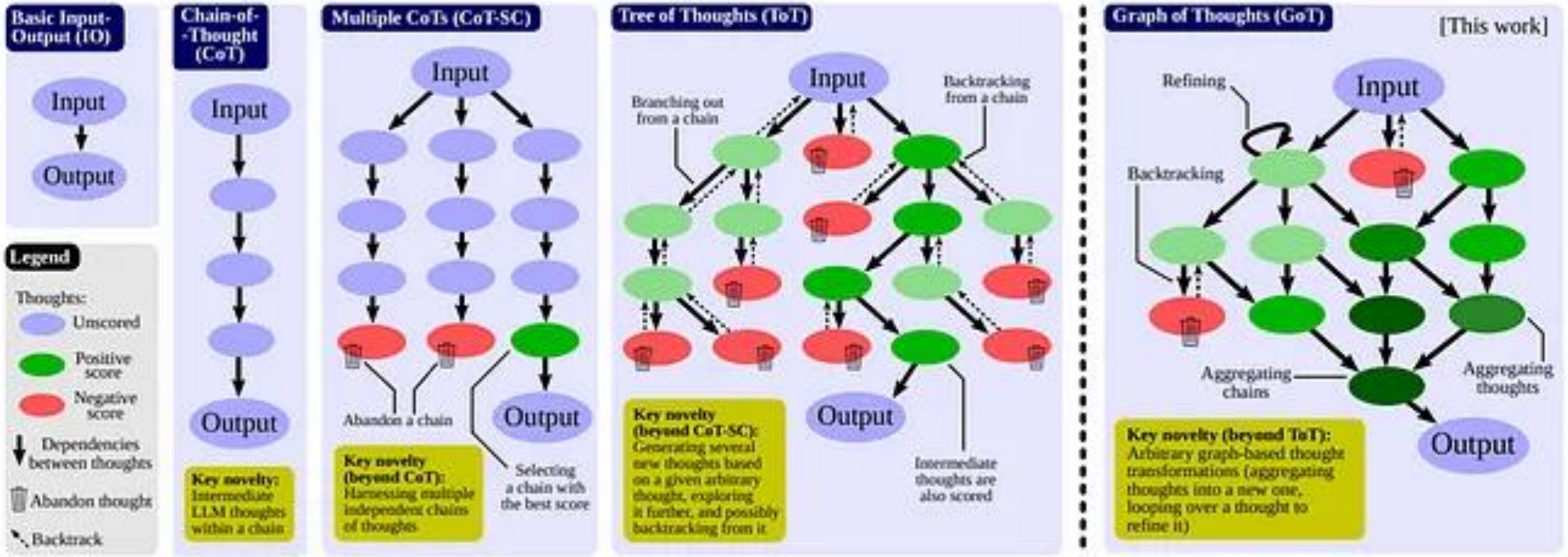
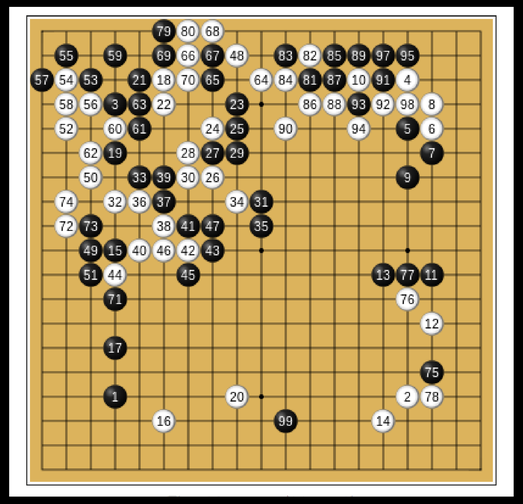


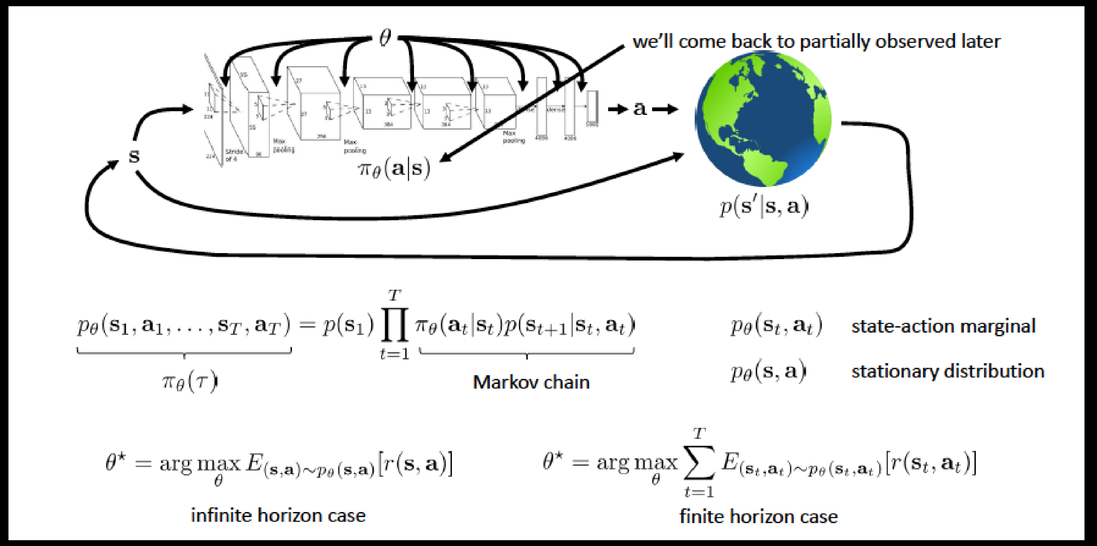
Figure 1: Comparison of Graph of Thoughts (GoT) to other prompting strategies.

AlphaGo



AI: ALPHAGO

REINFORCEMENT LEARNING



$$\underbrace{p_\theta(\mathbf{s}_1,\mathbf{a}_1,\ldots,\mathbf{s}_T,\mathbf{a}_T)}_{\pi_\theta(\tau)} = p(\mathbf{s}_1)\prod_{t=1}^{T}\underbrace{\pi_\theta(\mathbf{a}_t|\mathbf{s}_t)p(\mathbf{s}_{t+1}|\mathbf{s}_t,\mathbf{a}_t)}_{\text{Markov chain}}$$

$p_\theta(\mathbf{s}_t,\mathbf{a}_t)$ state-action marginal

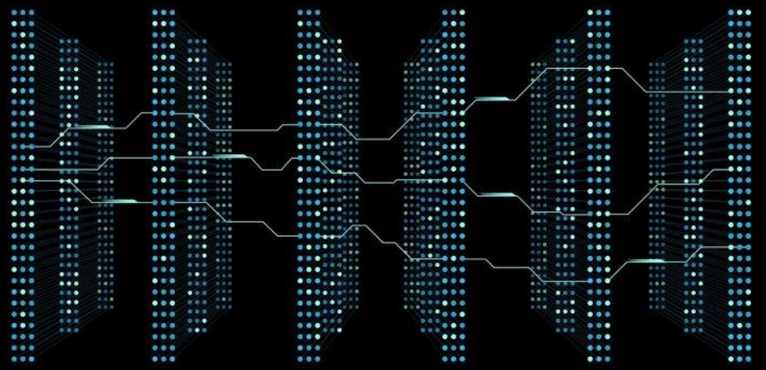
$p_\theta(\mathbf{s},\mathbf{a})$ stationary distribution

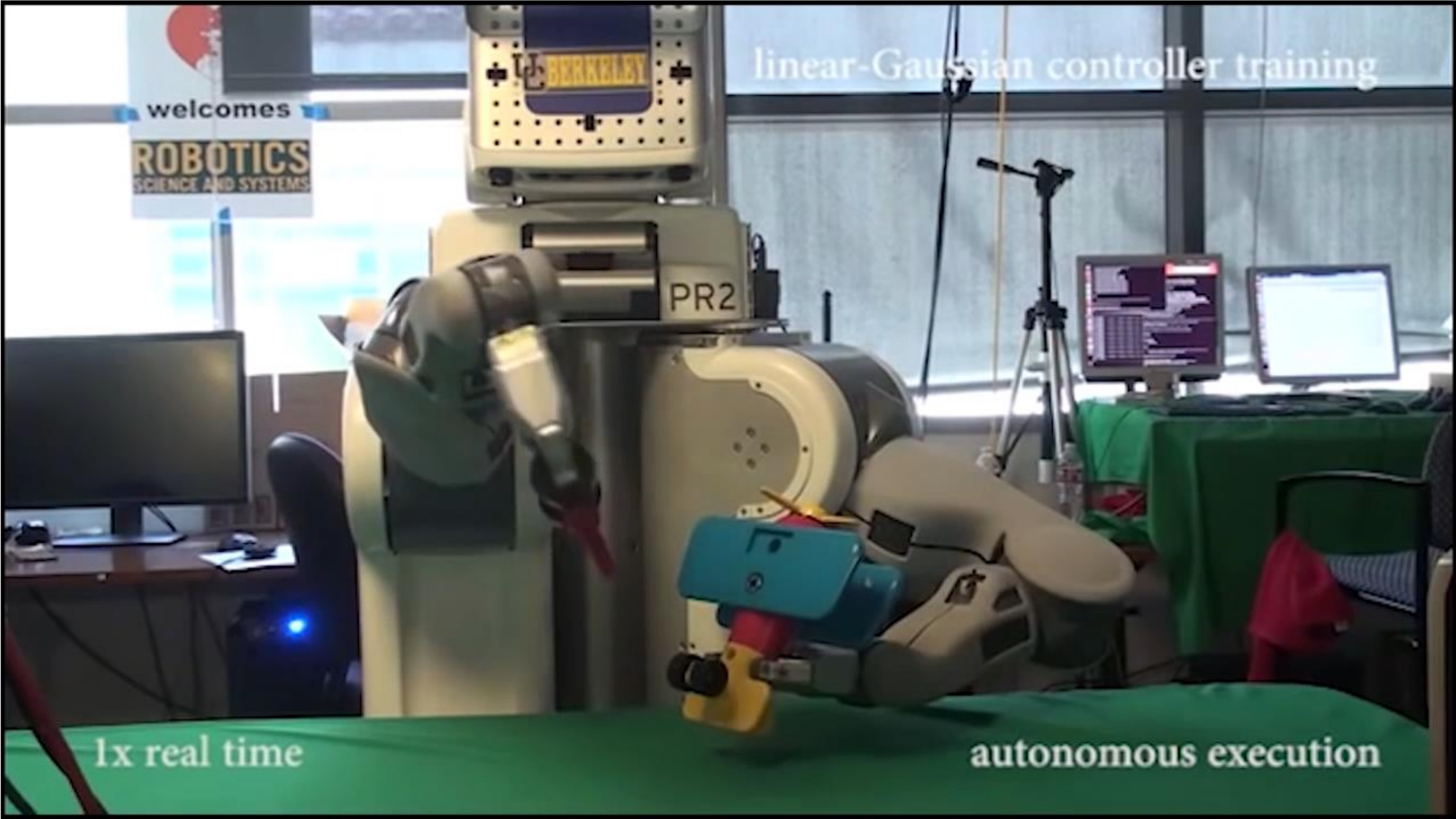
$$\theta^\star = \arg\max_\theta E_{(\mathbf{s},\mathbf{a})\sim p_\theta(\mathbf{s},\mathbf{a})}[r(\mathbf{s},\mathbf{a})]$$

infinite horizon case

$$\theta^\star = \arg\max_\theta \sum_{t=1}^{T} E_{(\mathbf{s}_t,\mathbf{a}_t)\sim p_\theta(\mathbf{s}_t,\mathbf{a}_t)}[r(\mathbf{s}_t,\mathbf{a}_t)]$$

finite horizon case




linear-Gaussian controller training
welcomes
ROBOTICS
SCIENCE AND SYSTEMS
BERKELEY
PR2
1x real time
autonomous execution

Model	AIME 2024		MATH-500	GPQA Diamond	LiveCode Bench	CodeForces
	pass@1	cons@64	pass@1	pass@1	pass@1	rating
OpenAI-o1-mini	63.6	80.0	90.0	60.0	53.8	1820
OpenAI-o1-0912	74.4	83.3	94.8	77.3	63.4	1843
DeepSeek-R1-Zero	71.0	86.7	95.9	73.3	50.0	1444

Table 2 | Comparison of DeepSeek-R1-Zero and OpenAI o1 models on reasoning-related benchmarks.

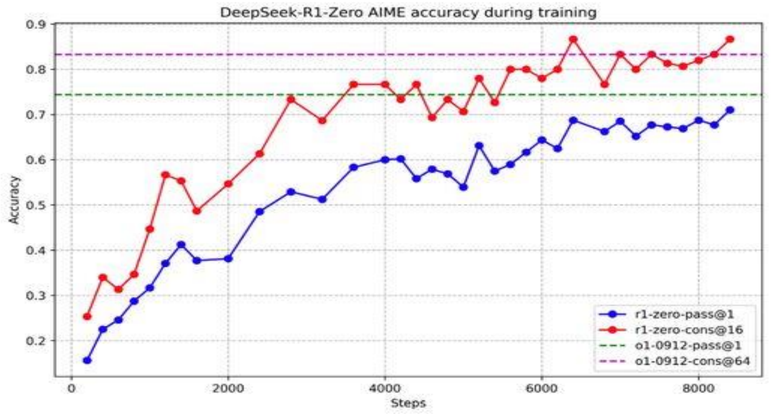
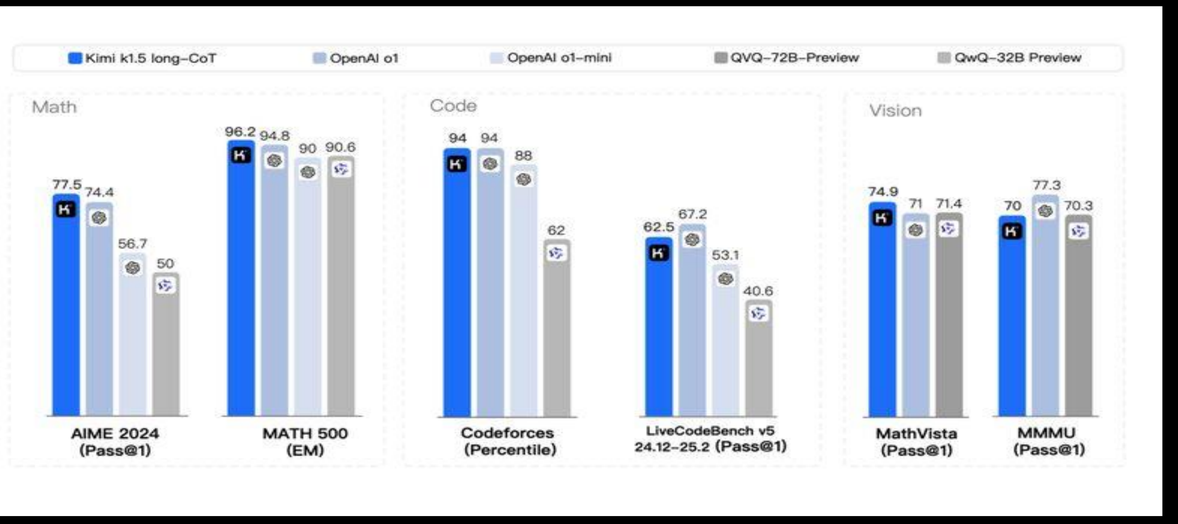
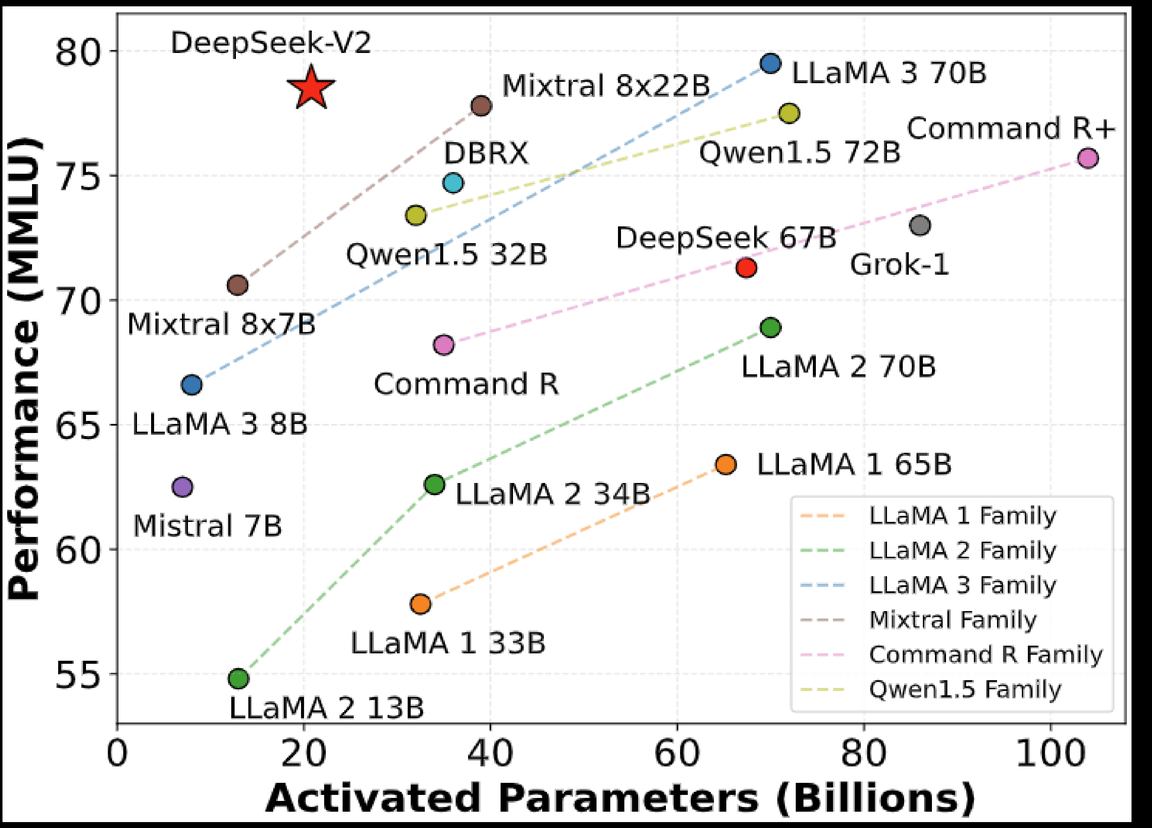


Figure 2 | AIME accuracy of DeepSeek-R1-Zero during training. For each question, we sample 16 responses and calculate the overall average accuracy to ensure a stable evaluation.



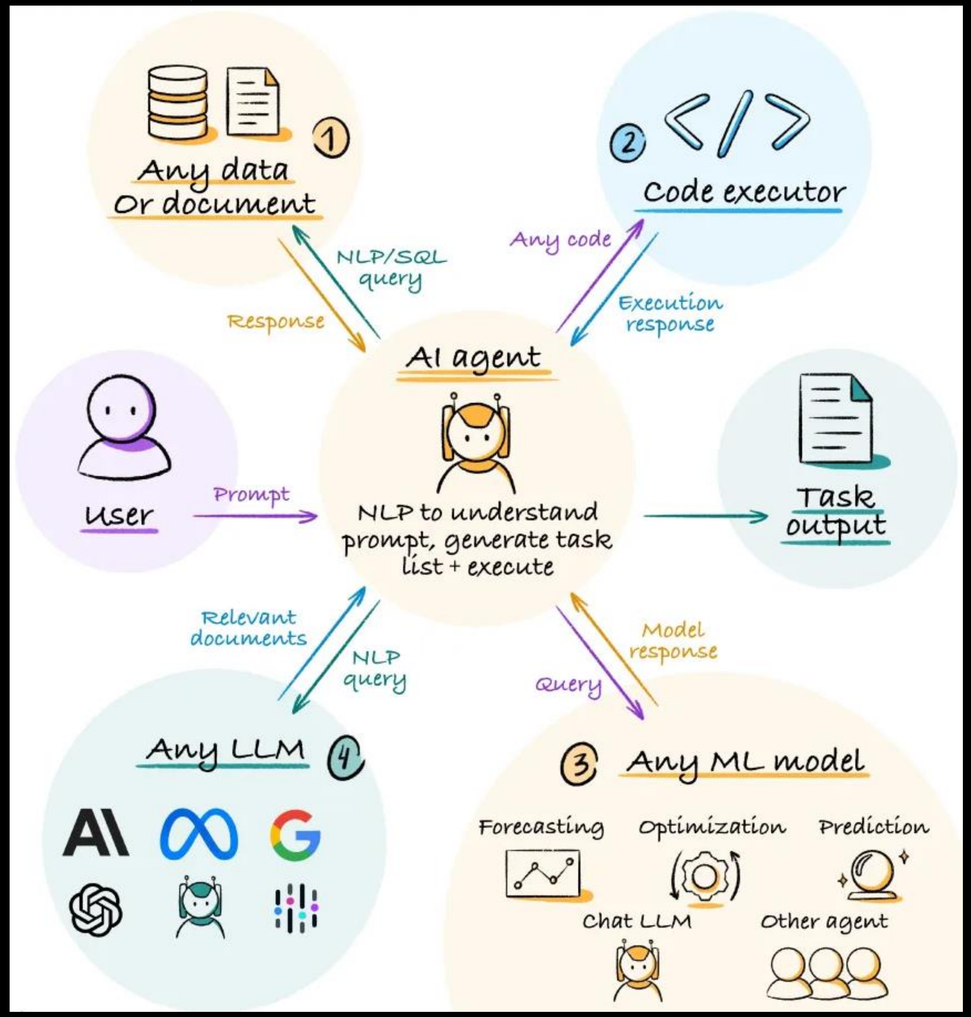
deepseek



AGENTS

How do AI agents work?

- **Goals**: Humans set goals for AI agents, but the agents decide how to achieve them.
- **Data collection**: AI agents collect data from their environment.
- **Decision making**: AI agents use the data they collect to make decisions about how to act.
- **Action**: AI agents perform actions to achieve their goals.



Types of Agents in AI

- Simple Reflex Agents
- Model-Based Reflex Agents
- Goal-Based Agents
- Utility-Based Agents
- Learning Agents
- Hierarchical Agents
- Multi-Agent Systems

JAMES WRIGHT

Phoenix, AZ 85023 | (555) 555-5555 | example@example.com

Career Objective

Dedicated and accomplished sociology assistant professor seeking a tenure-track position. Passionate about fostering academic development and supporting learning objectives. Committed to inspiring and mentoring students while contributing to sociological discourse through rigorous academic research.

Core Qualifications

- Research methodology
- Curriculum development
- Data analysis (SPSS, STATA)
- Qualitative and quantitative research
- Social theory
- Student mentorship
- Academic writing
- Statistical analysis

Education

Ph.D.: Sociology
Arizona State University
- Dissertation: "Contemporary Urban Dynamics"

Master of Arts: Sociology
Arizona State University - Tempe, AZ

Bachelor of Arts: Social Sciences
Arizona State University - Phoenix, AZ
Relevant coursework:
- Sociology
- Social Research Methods
- Social Theory
- Criminology
- Urban Sociology
- Social Movements and Change

Work Experience

Assistant Professor 01/2021 to Current
Grand Canyon University – Phoenix, AZ
- Develop and refine course materials for 10 undergraduate and graduate courses in sociology with over 150 students.
- Collaborate in curriculum improvement, leading to a 15% increase in student engagement and a 12% rise in overall course ratings.
- Support 20 undergraduate and graduate students, resulting in three award-winning research projects at the university's annual academic symposium.

Lecturer 09/2016 to 12/2020
The University Of Arizona – Phoenix, AZ
- Developed and taught introductory sociology courses for a diverse student body of 300, demonstrating adaptability in instruction and curricular design.
- Revitalized the college's research club, fostering a culture of inquiry and academic exploration, which led to a 30% increase in student research presentations at local conferences.
- Collaborated on a research project with the College of Education, examining the impact of early education on children's social development, resulting in a co-authored article in the "Journal of Educational Sociology."

Graduate Research Assistant 06/2013 to 08/2016
Arizona State University, Tempe Campus – Tempe, AZ
- Supported a comprehensive research project focused on gender and social inequality, which included data collection, qualitative analysis and report writing.
- Assisted in teaching undergraduate sociology courses to 60 students, delivering lectures on research methods, leading discussions and grading assignments.

ALICE PERRY

555 555 5555 • example@example.com • Memphis , TN 38106

SUMMARY STATEMENT

Driven lead biostatistician with a 14 year professional history meeting company goals utilizing consistent and organized practices. Skilled in working under pressure and adapting to new situations and challenges to best enhance teams and data. Willingness to take on added responsibilities to meet team goals.

CORE QUALIFICATIONS

- Dependable
- Responsible
- Leadership
- Data management
- PPE compliance
- Problem solving
- Collaboration
- Decision making
- MS Office
- G-Suite

EDUCATION

Ph.D.: Data Science And Engineering
The Bredeson Center | Knoxville, TN

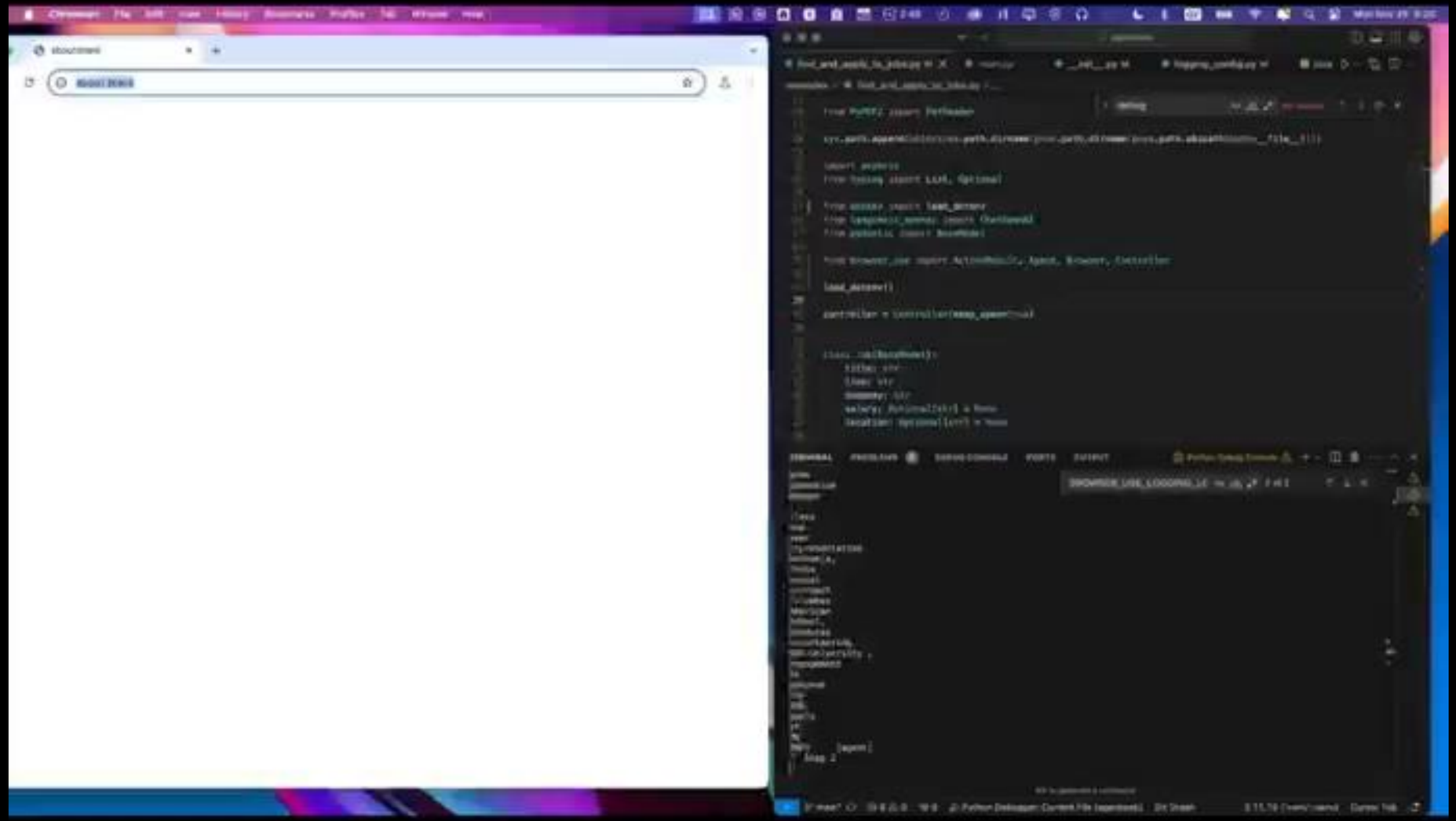
Master of Science: Biostatistics
Middle Tennessee State University | Murfreesboro, TN

Bachelor of Science: Data Science
Middle Tennessee State University | Murfreesboro, TN

WORK EXPERIENCE

Lead Biostatistician
St. Jude Children's Research Hospital | Memphis, TN | Jun 2017-Current
- Draws conclusions and makes predictions based on data summaries or statistical analysis.
- Monitors two clinical trials per time period or experiments to verify adherence to established procedures and quality of data collected.
- Analyzes clinical and survey data by using statistical approaches such as longitudinal analysis, mixed effect modeling, logistic regression analysis and model building techniques.

This AI agent can go through your CV, find matching jobs online, and start applying for them on its own

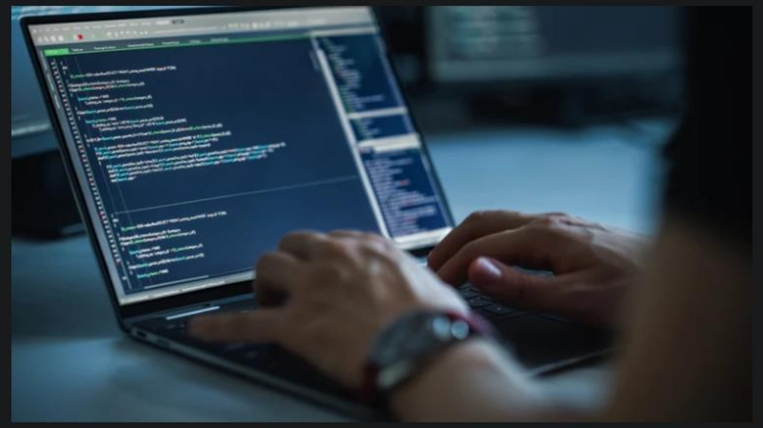


NEWS | 08 December 2022

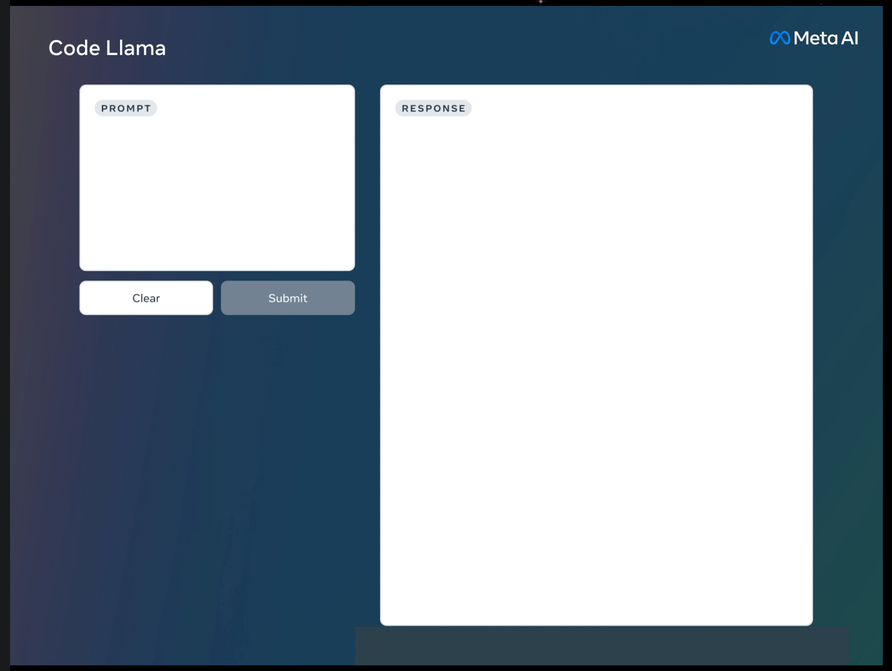
Are ChatGPT and AlphaCode going to replace programmers?

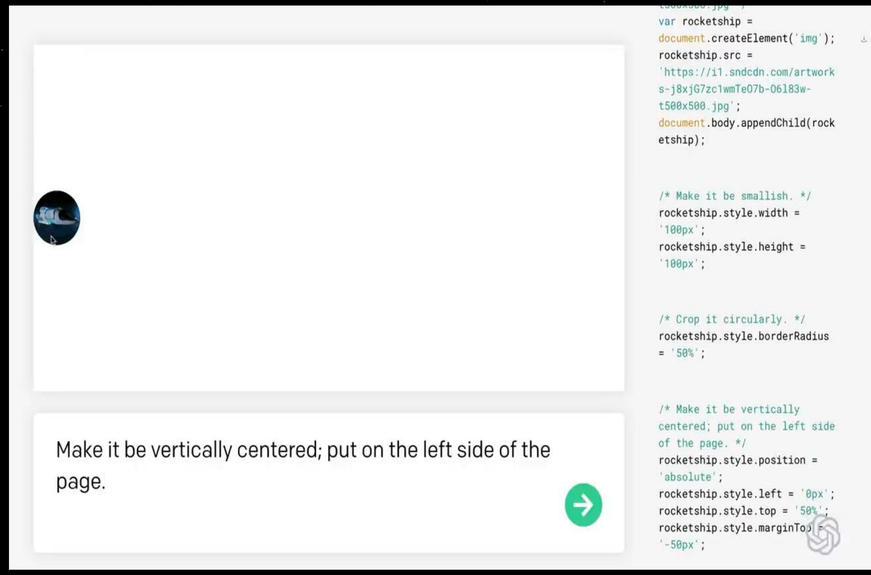
OpenAI and DeepMind systems can now produce meaningful lines of code, but software engineers shouldn't switch careers quite yet.

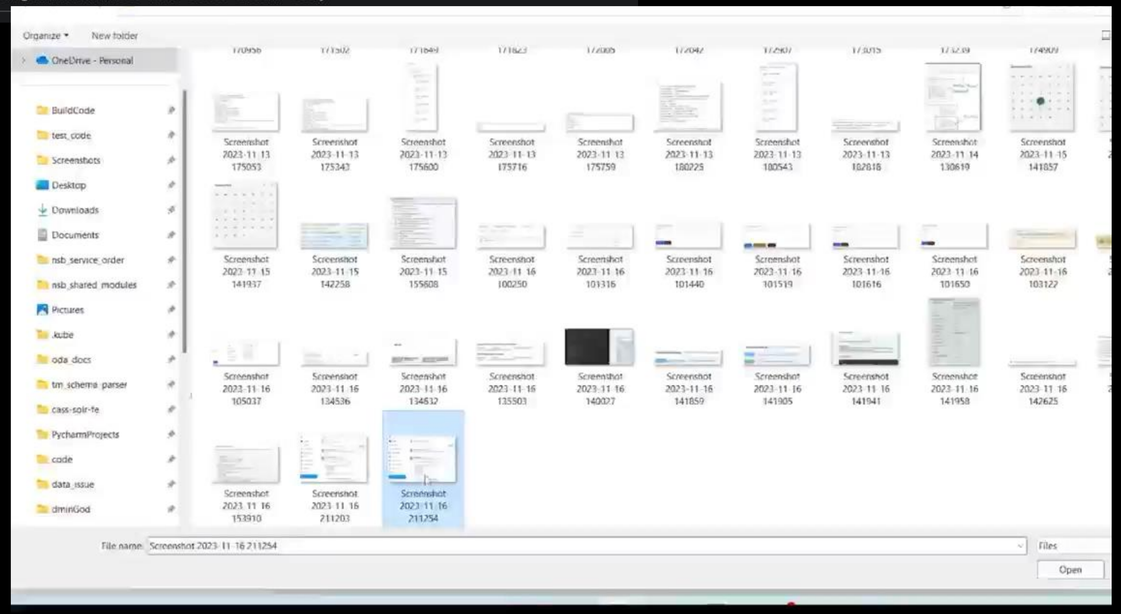
Davide Castelvecchi

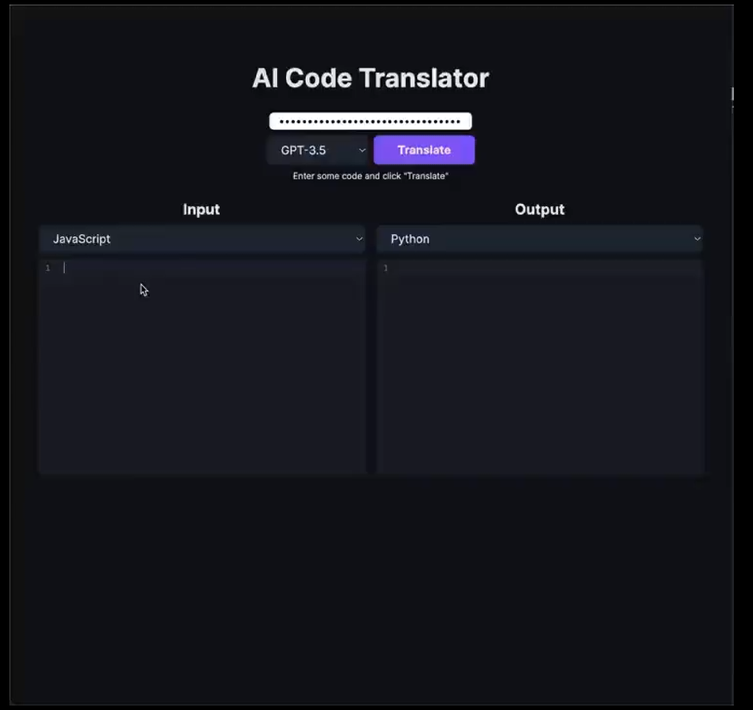


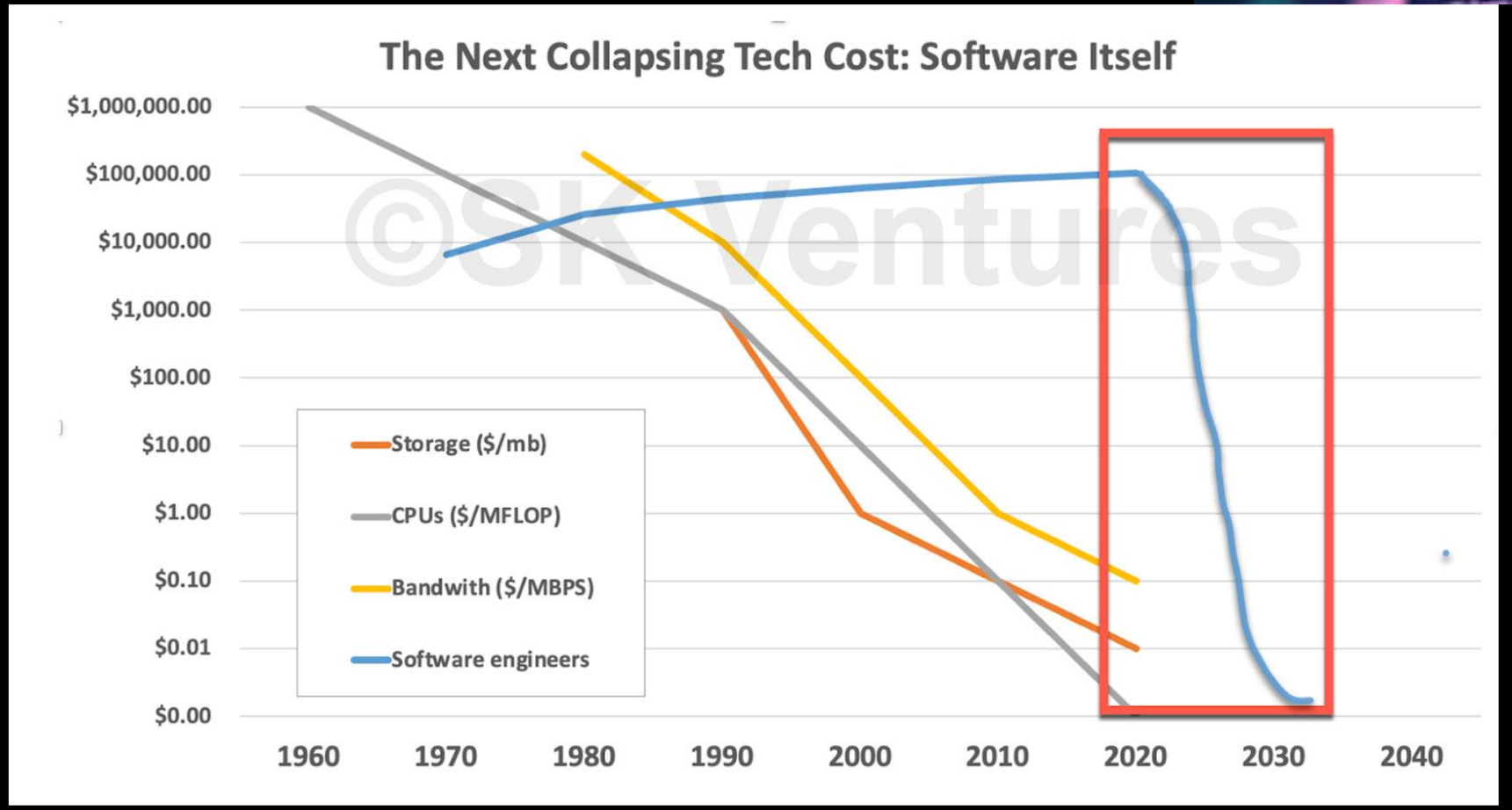
AI tools are competing with humans to write code. Credit: Getty



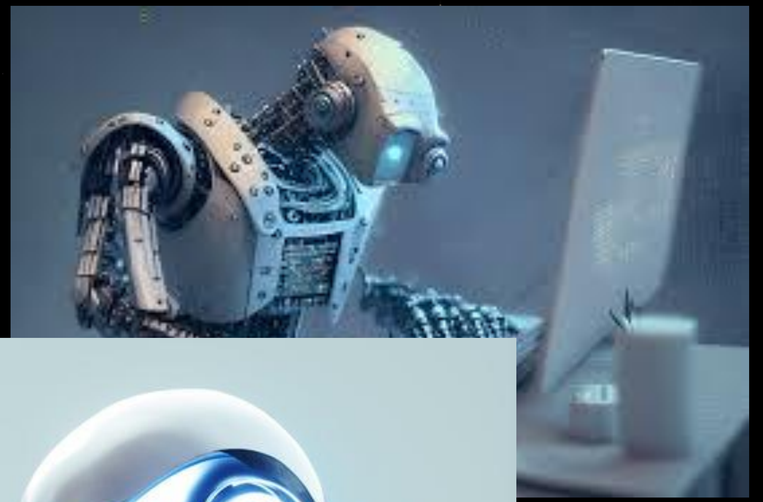


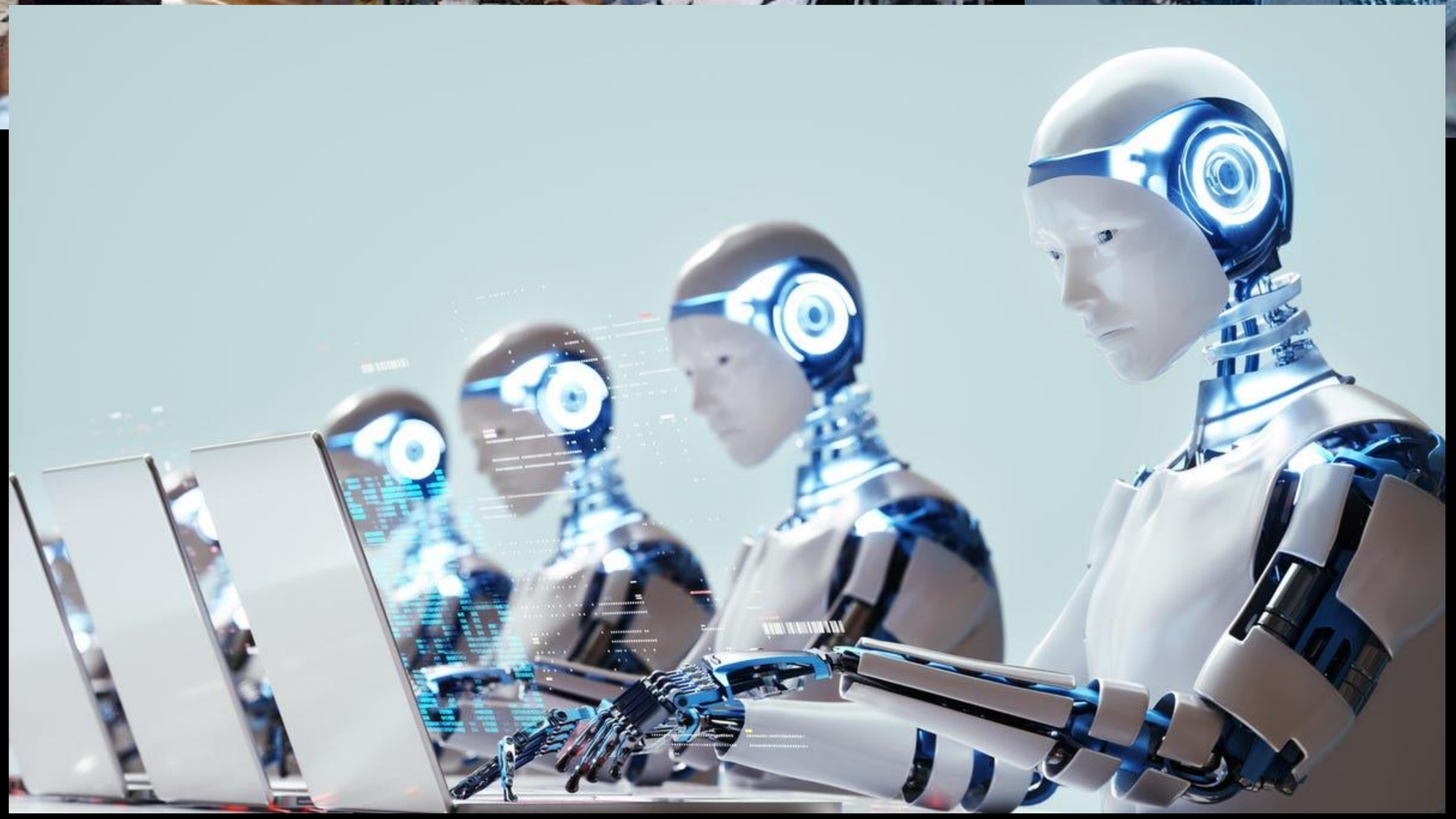


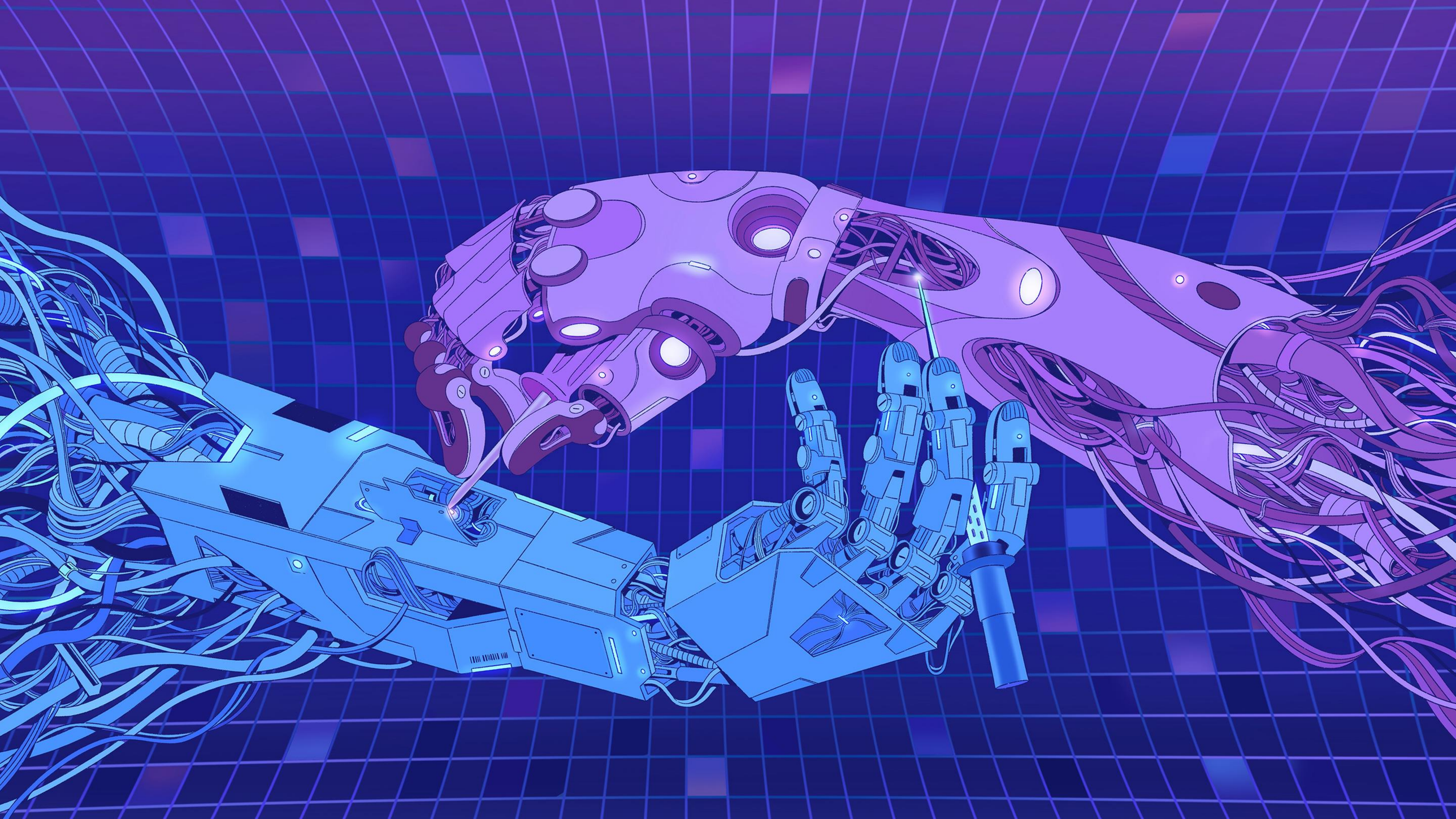


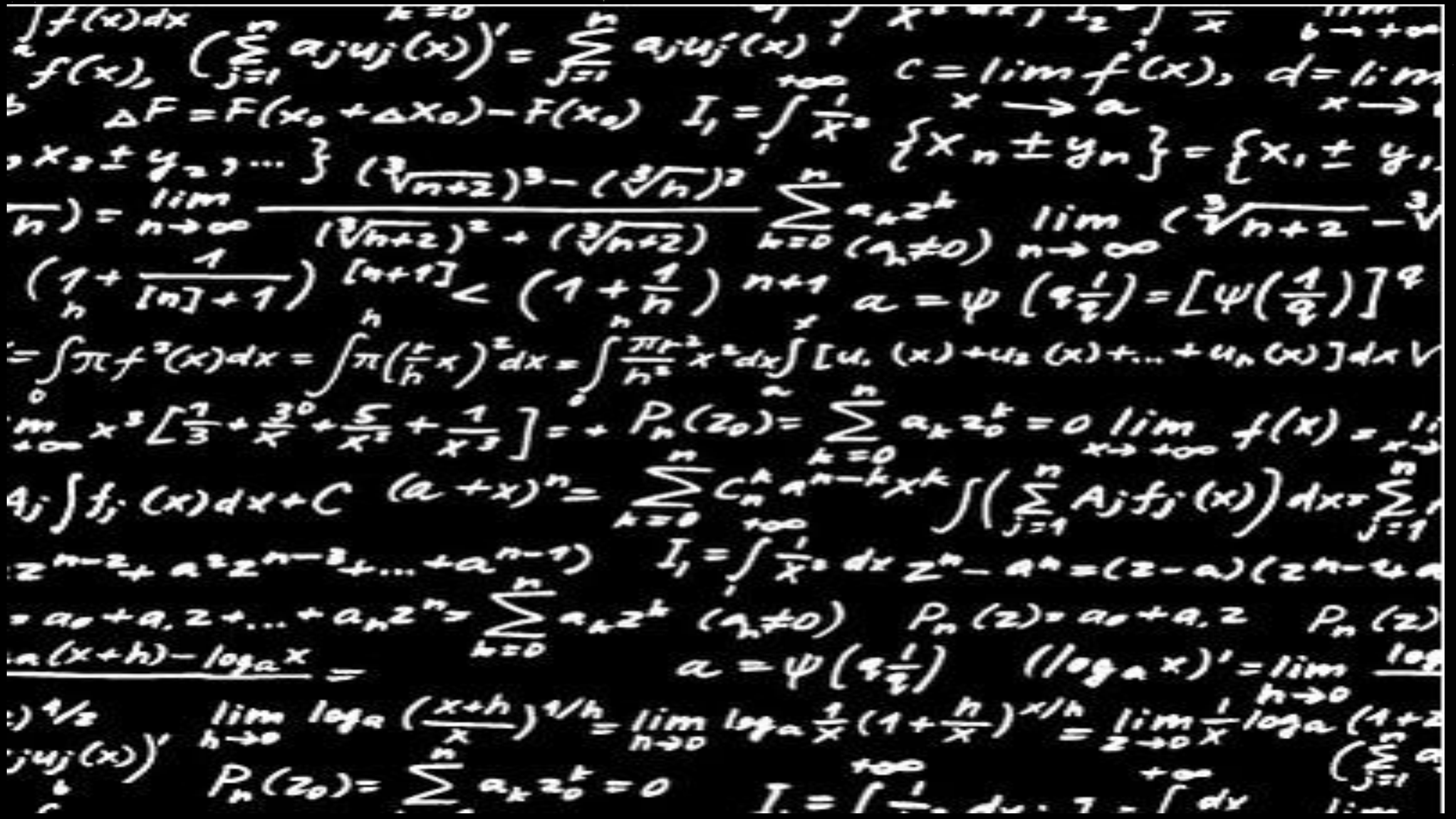

The Next Collapsing Tech Cost: Software Itself
$1,000,000.00
$100,000.00
$10,000.00
$1,000.00
$100.00
$10.00
$1.00
$0.10
$0.01
$0.00
Storage ($/mb)
CPUs ($/MFLOP)
Bandwith ($/MBPS)
Software engineers
1960
1970
1980
1990
2000
2010
2020
2030
2040
©SK Ventures

LEAP



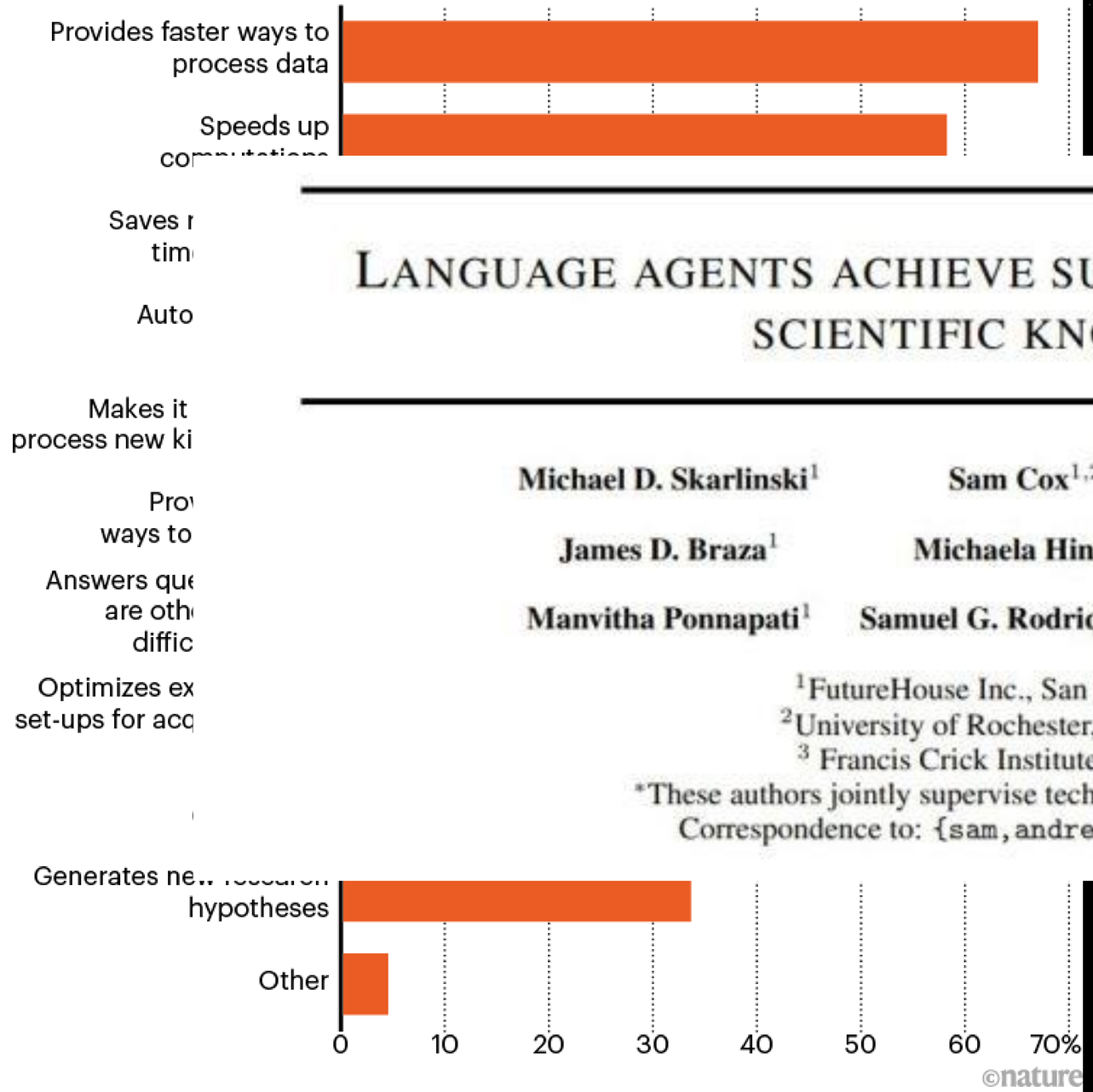


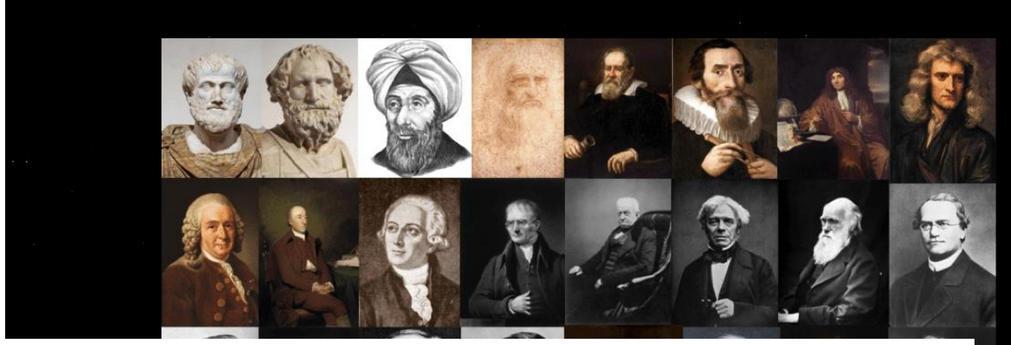




POSITIVE IMPACTS OF AI

Q: Considering machine-learning methods, what do you think are positive impacts of AI in research? (Choose all that apply.)





LANGUAGE AGENTS ACHIEVE SUPERHUMAN SYNTHESIS OF SCIENTIFIC KNOWLEDGE

Michael D. Skarlinski[1] **Sam Cox**[1,2] **Jon M. Laurent**[1]

James D. Braza[1] **Michaela Hinks**[1] **Michael J. Hammerling**[1]

Manvitha Ponnapati[1] **Samuel G. Rodriques**[1,3*] **Andrew D. White**[1,2*]

[1]FutureHouse Inc., San Francisco, CA
[2]University of Rochester, Rochester, NY
[3] Francis Crick Institute, London, UK
*These authors jointly supervise technical work at FutureHouse.
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The AI Scientist: Towards Fully Automated Open-Ended Scientific Discovery

Chris Lu[1,2,*], **Cong Lu**[3,4,*], **Robert Tjarko Lange**[1,*], **Jakob Foerster**[2,†], **Jeff Clune**[3,4,5,†] **and David Ha**[1,†]

[*]Equal Contribution, [1]Sakana AI, [2]FLAIR, University of Oxford, [3]University of British Columbia, [4]Vector Institute, [5]Canada CIFAR AI Chair, [†]Equal Advising

The AI Scientist: Towards Fully Automated Open-Ended Scientific Discovery

Chris Lu[1,2,*], **Cong Lu**[3,4,*], **Robert Tjarko Lange**[1,*], **Jakob Foerster**[2,†], **Jeff Clune**[3,4,5,†] **and David Ha**[1,†]
[*]Equal Contribution, [1]Sakana AI, [2]FLAIR, University of Oxford, [3]University of British Columbia, [4]Vector Institute, [5]Canada CIFAR AI Chair, [†]Equal Advising

Table 1 | **Performance of The AI Scientist's automated LLM reviewing system on 500 ICLR 2022 papers. We show mean and 95% bootstrap confidence intervals, and highlight the comparison between the human baseline and our best AI reviewer.**

	Reviewer	Balanced Acc. ↑	Accuracy ↑	F1 Score ↑	AUC ↑	FPR ↓	FNR ↓
	Human (NeurIPS)[1]	**0.66**	**0.73**	**0.49**	**0.65**	**0.17**	**0.52**
	Random Decision	0.50	0.50	0.40	0.50	0.50	0.50
	Always Reject	0.50	0.59	0.00	0.50	0.00	1.00
Uncalibrated	Sonnet 3.5	0.52 ± 0.01	0.40 ± 0.01	0.55 ± 0.01	0.52 ± 0.01	0.95 ± 0.02	0.00 ± 0.00
	GPT-4o-mini	0.53 ± 0.02	0.65 ± 0.01	0.11 ± 0.06	0.53 ± 0.02	0.01 ± 0.01	0.94 ± 0.04
	GPT-4o (0-shot)	0.61 ± 0.04	0.68 ± 0.03	0.43 ± 0.07	0.61 ± 0.04	0.11 ± 0.03	0.67 ± 0.07
	GPT-4o (1-shot)	0.60 ± 0.03	**0.70 ± 0.03**	0.37 ± 0.08	0.60 ± 0.03	0.04 ± 0.02	0.76 ± 0.06
Calibrated	Sonnet 3.5 @8	0.59 ± 0.04	0.65 ± 0.04	0.45 ± 0.06	0.59 ± 0.04	0.20 ± 0.04	0.61 ± 0.07
	GPT-4o-mini @6	0.59 ± 0.04	0.64 ± 0.04	0.45 ± 0.06	0.59 ± 0.04	0.22 ± 0.05	0.60 ± 0.07
	GPT-4o (0-shot) @6	0.63 ± 0.04	0.63 ± 0.04	0.56 ± 0.05	0.63 ± 0.04	0.38 ± 0.05	0.36 ± 0.07
	GPT-4o (1-shot) @6	**0.65 ± 0.04**	**0.66 ± 0.04**	**0.57 ± 0.05**	**0.65 ± 0.04**	**0.31 ± 0.05**	**0.39 ± 0.07**

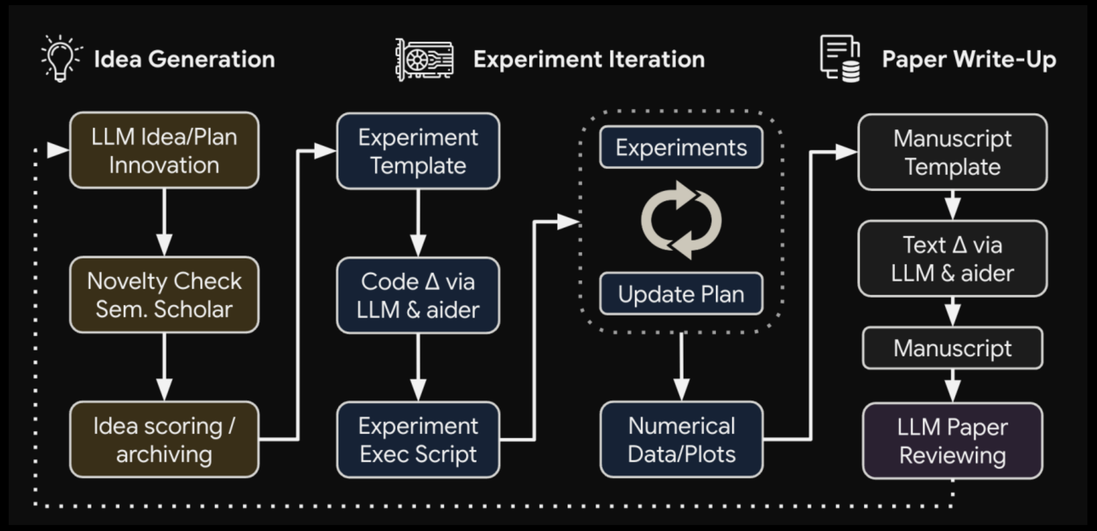


Figure 3 | Preview of the "Adaptive Dual-Scale Denoising" paper which was entirely autonomously generated by The AI Scientist. The full paper can be viewed in Appendix D.1

Empowering Biomedical Discovery with AI Agents

Shanghua Gao[1], Ada Fang[1,2,8,+], Yepeng Huang[1,3,+], Valentina Giunchiglia[1,4,+], Ayush Noori[1,5,+], Jonathan Richard Schwarz[1], Yasha Ektefaie[1,6], Jovana Kondic[7], and Marinka Zitnik[1,8,9,10,#]

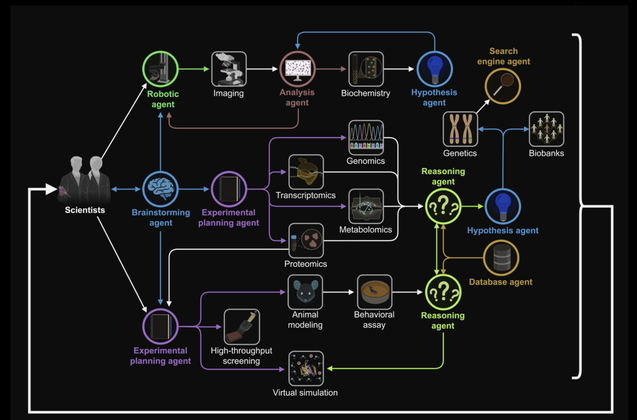
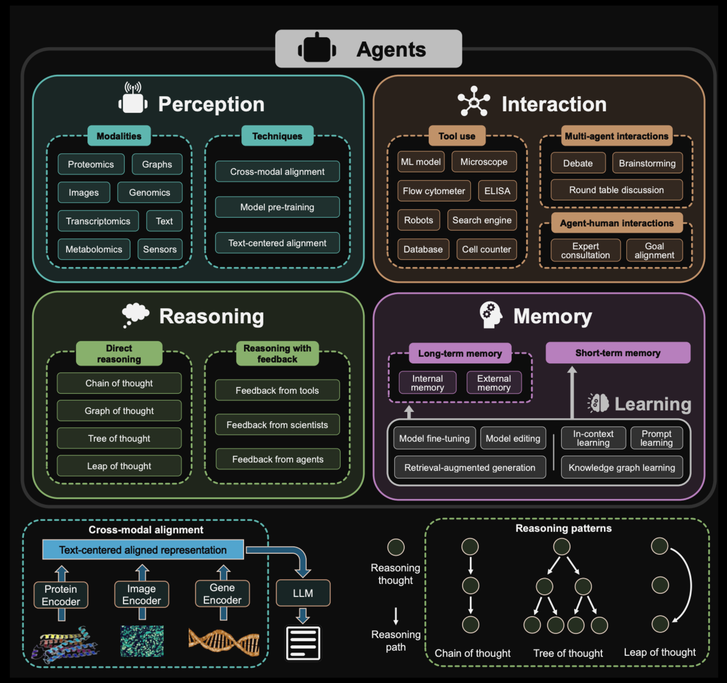
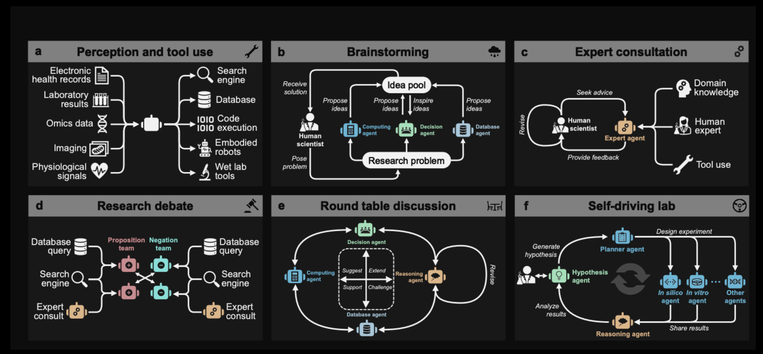


Figure 1: Empowering biomedical research with AI agents. AI agents pave the way for "AI scientists" capable of skeptical learning and reasoning. These multi-agent systems consist of agents based on conversable large language models (LLMs) and can coordinate machine learning (ML) tools, experimental platforms, humans, or even combinations of them. Robotic agent, AI agent that operates robotic hardware for physical experiments; Database agent, AI agent that can information in databases via 'function calling' and APIs; Reasoning agent, AI agent capable of direct reasoning and reasoning with feedback; Hypothesis agent, AI agent that is creative and reflective when developing hypotheses, capable of characterizing its own uncertainty and using that as a driver to refine its scientific knowledge bases; Brainstorming agent, AI agent that generates a broad spectrum of research ideas; Search engine agent, AI agent that uses search engines as tools to rapidly gather information; Analysis agent, AI agent capable of analyzing experimental results to summarize findings and synthesize concepts; Experimental planning agent, AI agent that optimizes an experimental protocol for execution.





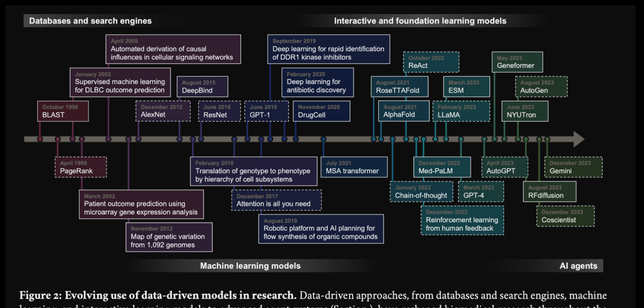
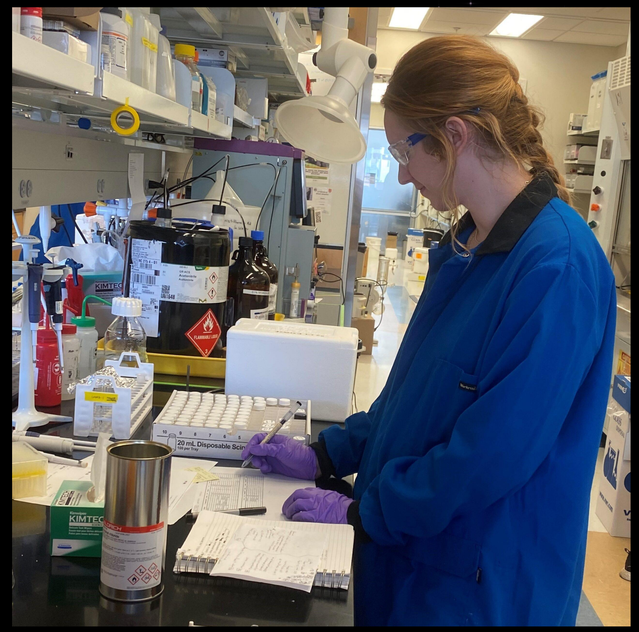


Figure 2: Evolving use of data-driven models in research. Data-driven approaches, from databases and search engines, machine learning, and interactive learning models to advanced agent systems (Section), have reshaped biomedical research throughout the last several decades. Dashed boxes represent studies focused predominantly on algorithmic machine learning innovation; solid-line boxes represent studies focused predominantly on biomedical discovery.



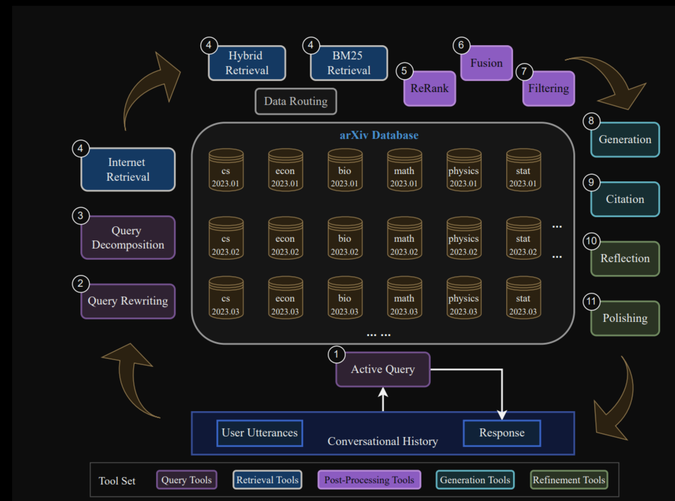
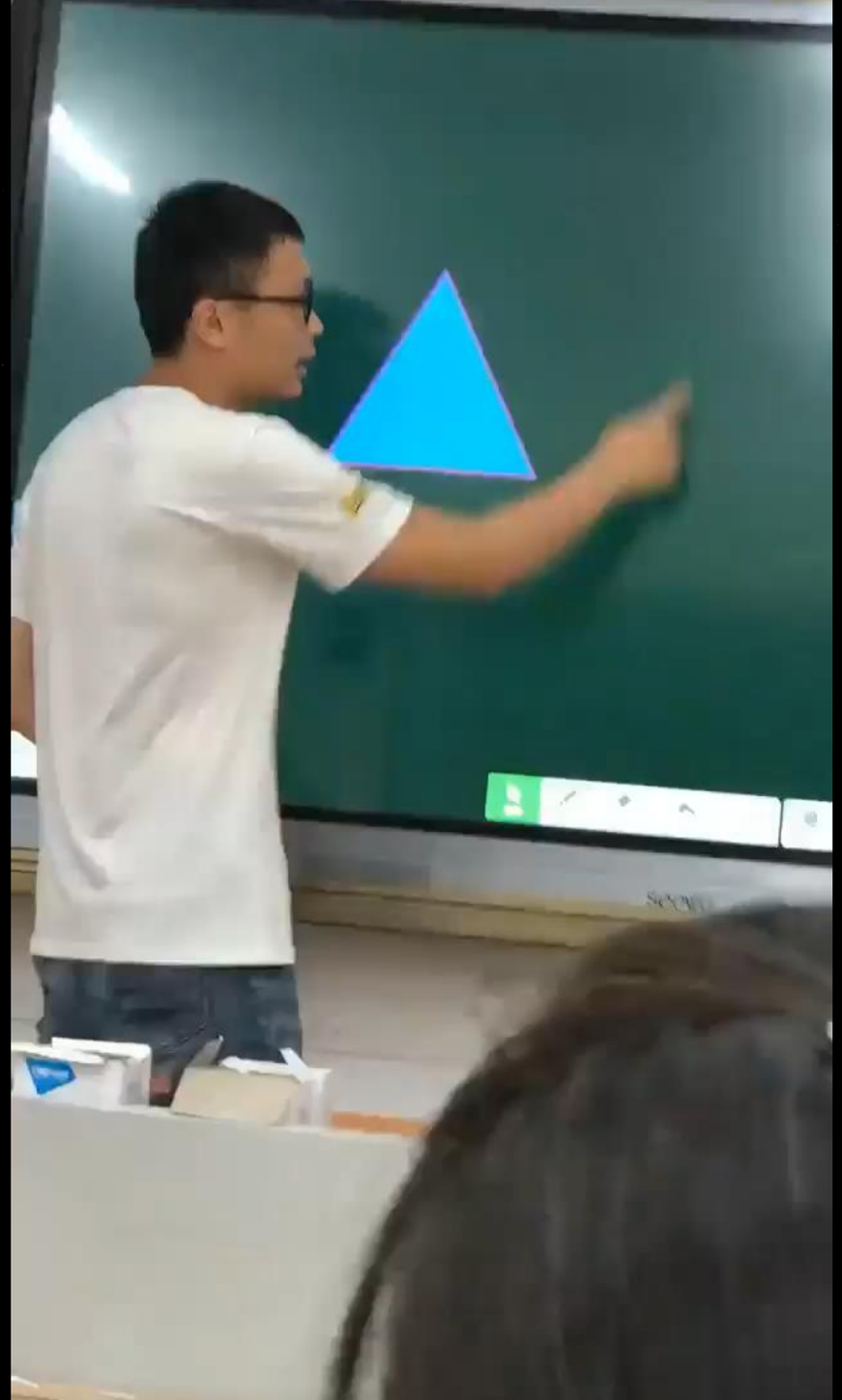
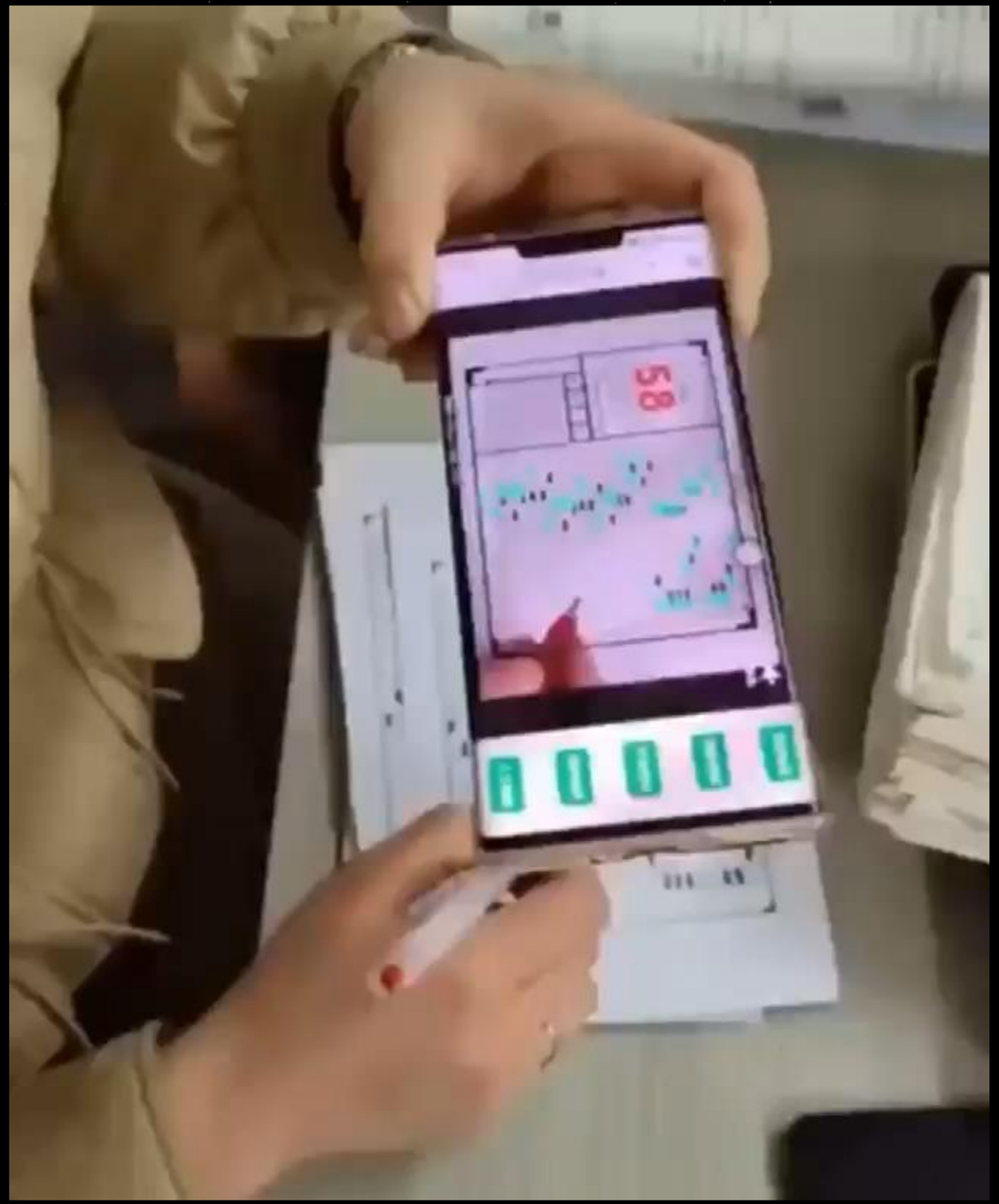


Figure 1: Main Workflow of OpenResearcher.




58

What would you like to learn today?

Type or share a file to start...

History

Tell me about the history of writing.

Before emojis and keyboards, how did humans communicate through the ages? Let's explore the evolution of the written word and discover how it has shaped cultures, preserved knowledge, and empowered societies.

Arts

What is the meaning of "The Scream" by Edvard Munch?

This famous painting has left many people wondering about its meaning. Let's take a closer look at the iconic artwork to understand the story behind its unsettling imagery.

Culture

What's the biggest wave ever surfed?

Imagine a wave taller than a building. Believe it or not, someone has surfed it. Let's discover the record-breaking waves conquered by surfers (and the ones that got away).

Biology

What causes some sea creatures to glow?

Uncover the secrets of the deep. Why

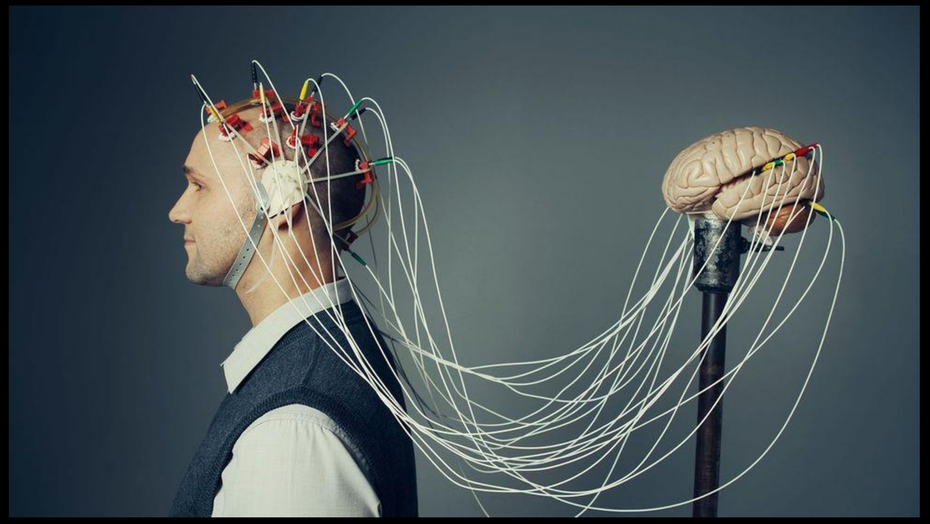
Astronomy

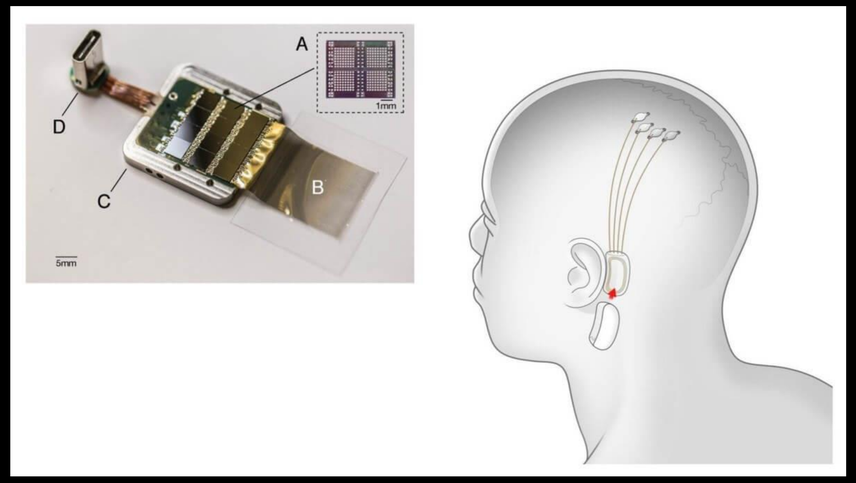
How do scientists study black holes?

Black holes are invisible yet scientists have managed to learn a lot about them. Let's explore the clues that help study

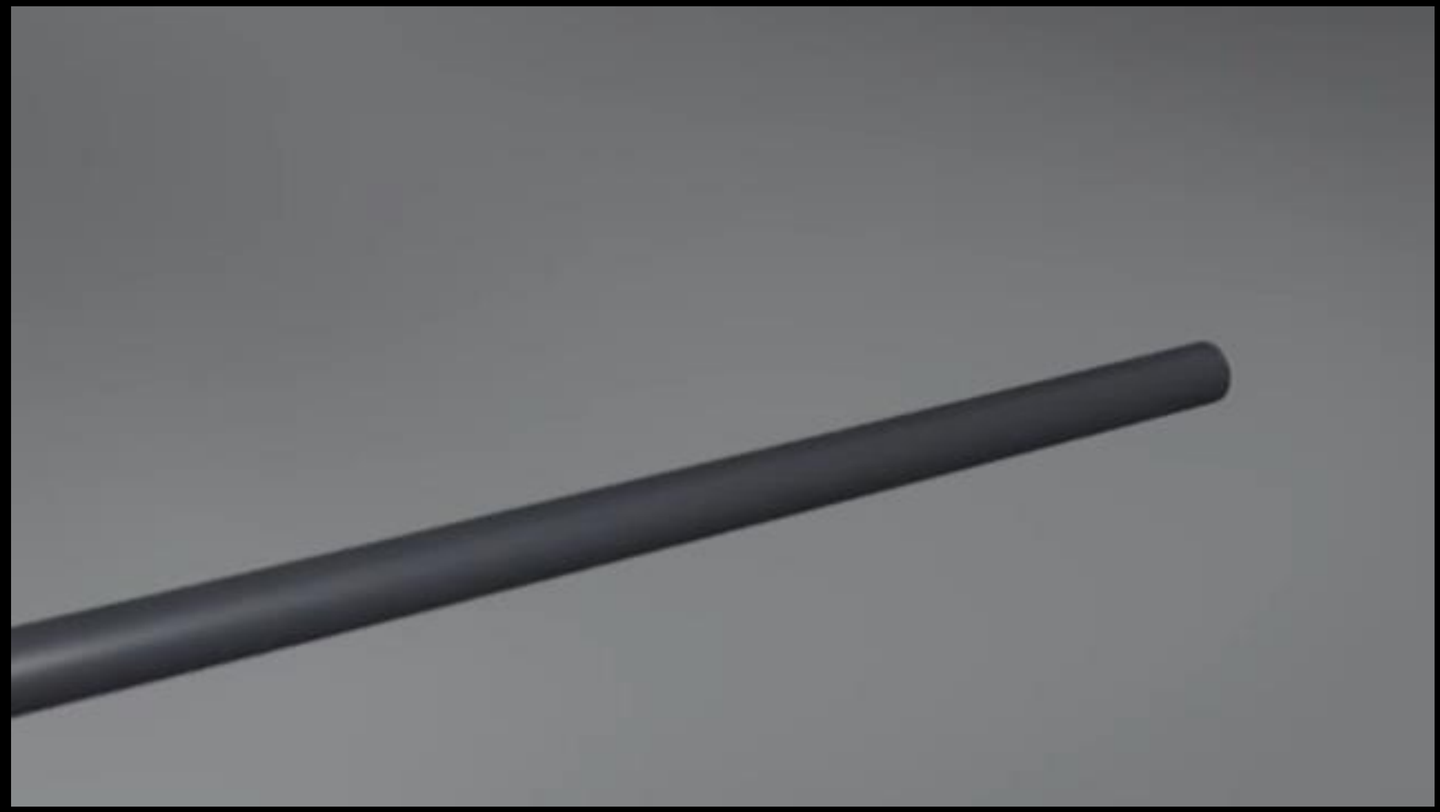

Chinese kids are learning
English with AI Human?!
语学习词典
I'm not sure what you're
referring to

BRAIN COMPUTER INTERFACE

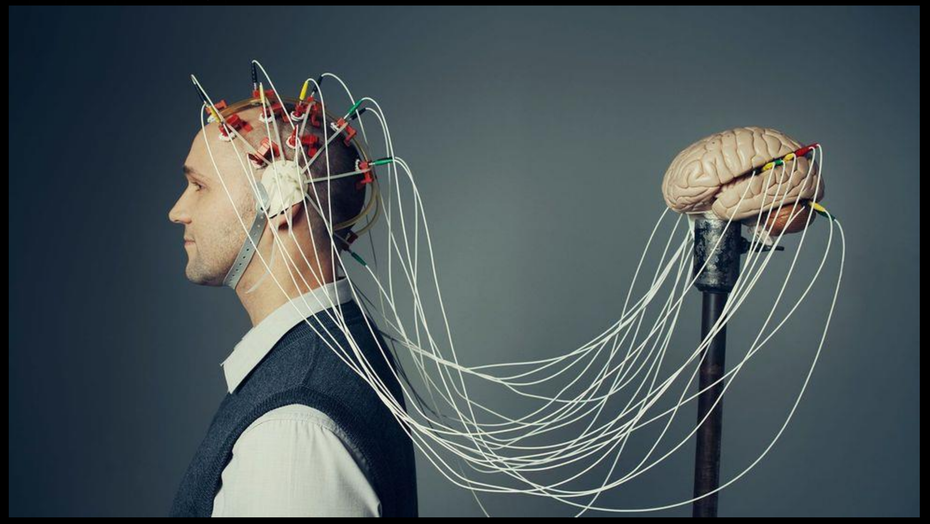


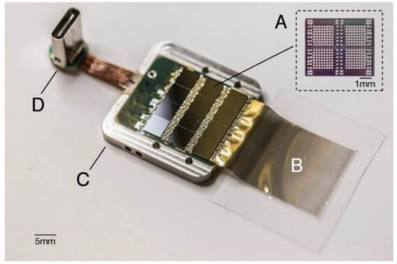


NEURALINK



SYNCHRON




A
1mm
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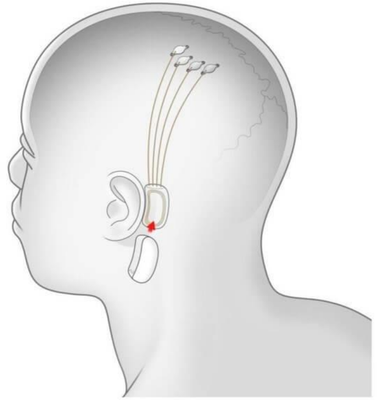


Neurale
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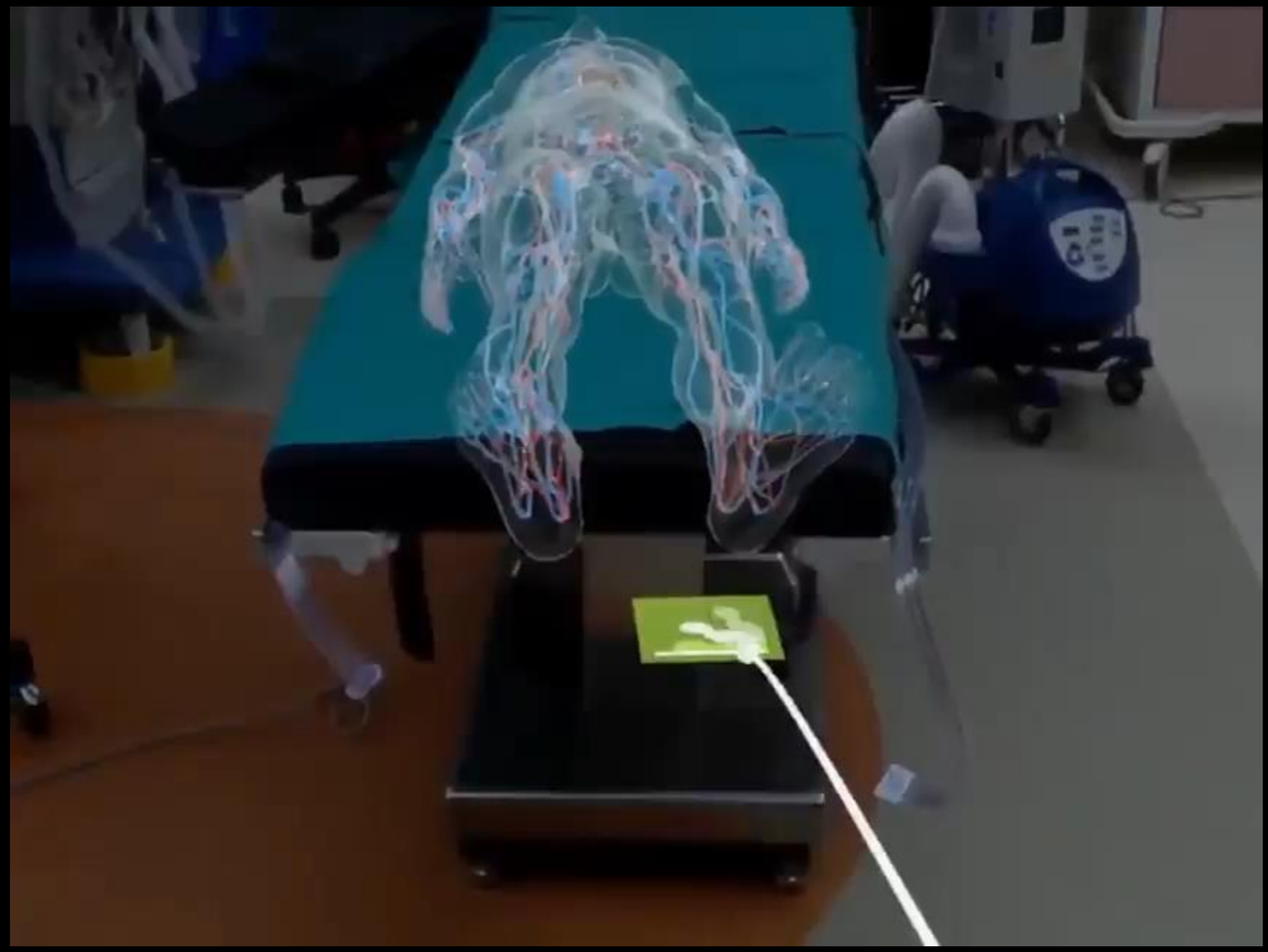
科学
数学
ENGLISH
语文
课时练

ENGINEERING AND MEDICAL ASSISTANTS

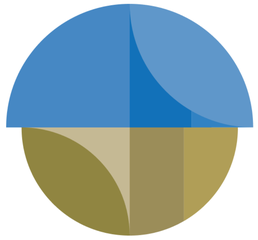


WORLD ECONOMIC FORUM

Job landscape

By 2025, new jobs will emerge and others be displaced by a shift in the division of labour between humans and machines, affecting:

97 million



85 million

Growing job demand:

1. Data Analysts and Scientists
2. AI and Machine Learning Specialists
3. Big Data Specialists
4. Digital Marketing and Strategy Specialists
5. Process Automation Specialists
6. Business Development Professionals
7. Digital Transformation Specialists
8. Information Security Analysts
9. Software and Applications Developers
10. Internet of Things Specialists

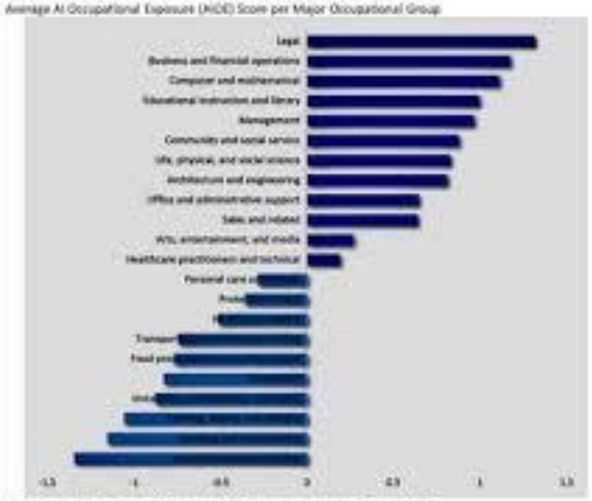
Decreasing job demand:

1. Data Entry Clerks
2. Administrative and Executive Secretaries
3. Accounting, Bookkeeping and Payroll Clerks
4. Accountants and Auditors
5. Assembly and Factory Workers
6. Business Services and Administration Managers
7. Client Information and Customer Service Workers
8. General and Operations Managers
9. Mechanics and Machinery Repairers
10. Material-Recording and Stock-Keeping Clerks

Source: Future of Jobs Report 2020, World Economic Forum.

Figure 1. White-collar jobs are more likely to be exposed to AI.

Average AI Occupational Exposure (AIOE) Score per Major Occupational Group

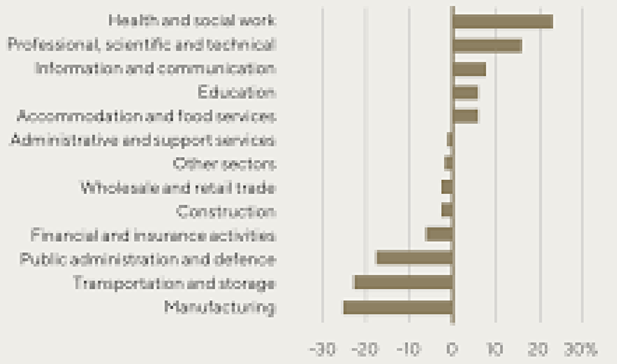


North Carolina Department of Commerce, Labor & Economic Analysis Division (LEAD)

Analysis of data from Felten, E., Raj, M., & Seamans, R. (2021). Occupational, industry, and geographic exposure to artificial intelligence: A novel dataset and its potential uses. Strategic Management Journal, 42, 2195–2217. https://doi.org/10.1002/smj.3286

How AI will affect the job market

Predicted net job creation by sector (2017–2037)



pwc

GUILD

commentary in snack-sized mouthfuls

"I want AI to do my laundry and dishes so that I can do art and writing, not for AI to do my art and writing so that I can do my laundry and dishes."

Author and videogame enthusiast **Joanna Maciejewska** nails it (although bathroom cleaning goes ahead of laundry and dishes)

"I'm sure I deserve

Prof (Dr) Simon See

Prof (Adj), Univ of Newcastle, Coventry, Mahindra, UI, BUPT, SJTU, NTU

Distinguish Fellow, Fudan Uni

And

Head of AI Technology Center, NVIDIA