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AI and the Future of Jobs

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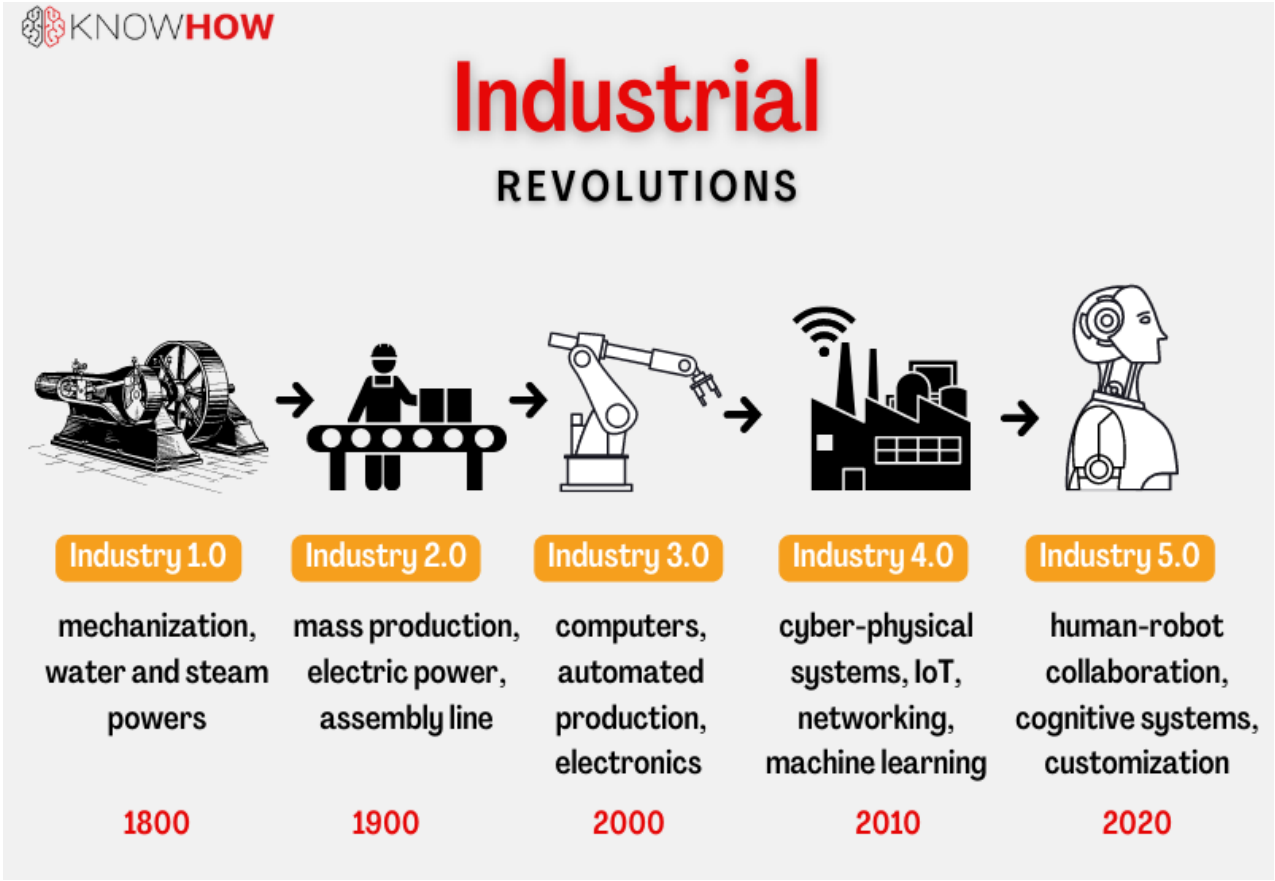
The World is Changing Faster than We can Understand

- AI won't replace humans — but humans using AI will replace humans not using AI
- AI is moving from *tools* that assist humans to *agents* that act autonomously
- Autonomous, Physical, Goal-Driven, Learning Systems



https://knowhow.distrelec.com/manufacturing/is-your-business-ready-for-industry-5-0/

AI is no longer a Tool! It is a Partner!

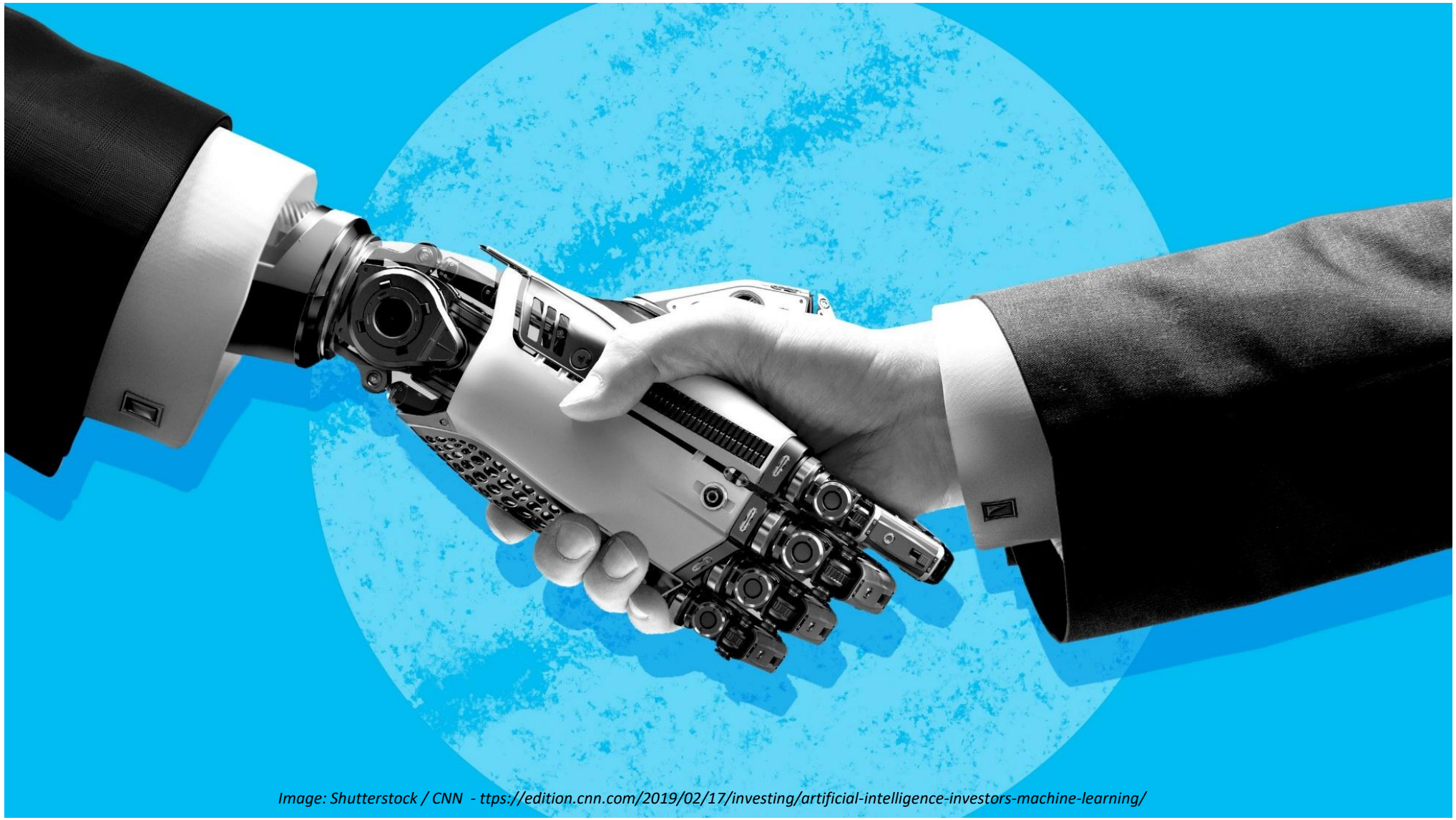
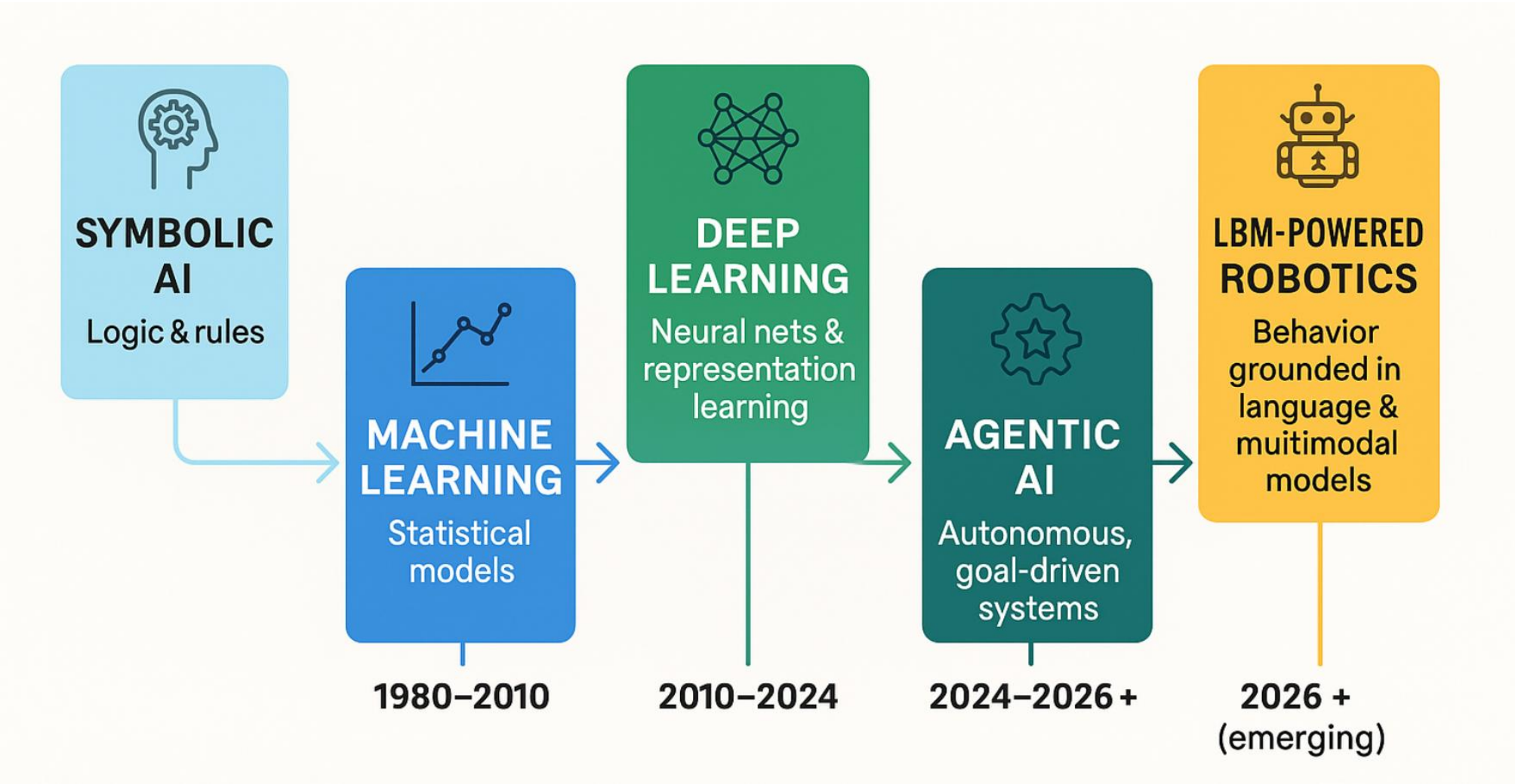


Image: Shutterstock / CNN - ttps://edition.cnn.com/2019/02/17/investing/artificial-intelligence-investors-machine-learning/

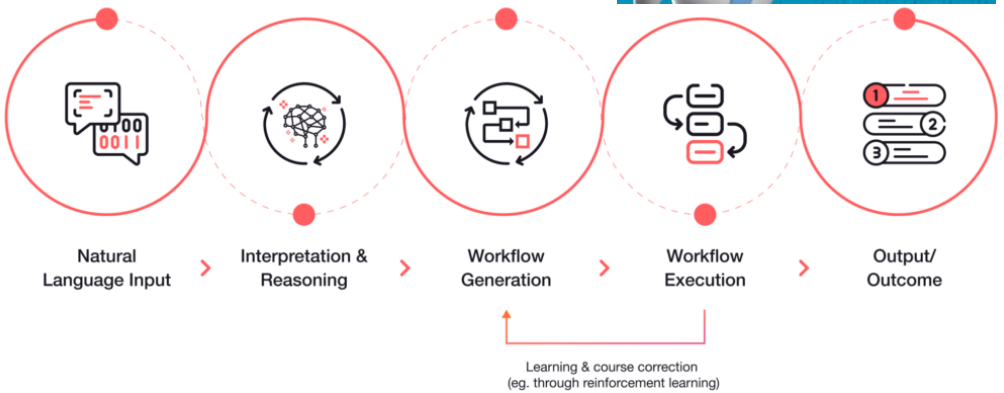
Evolution of AI Paradigms



Agentic AI

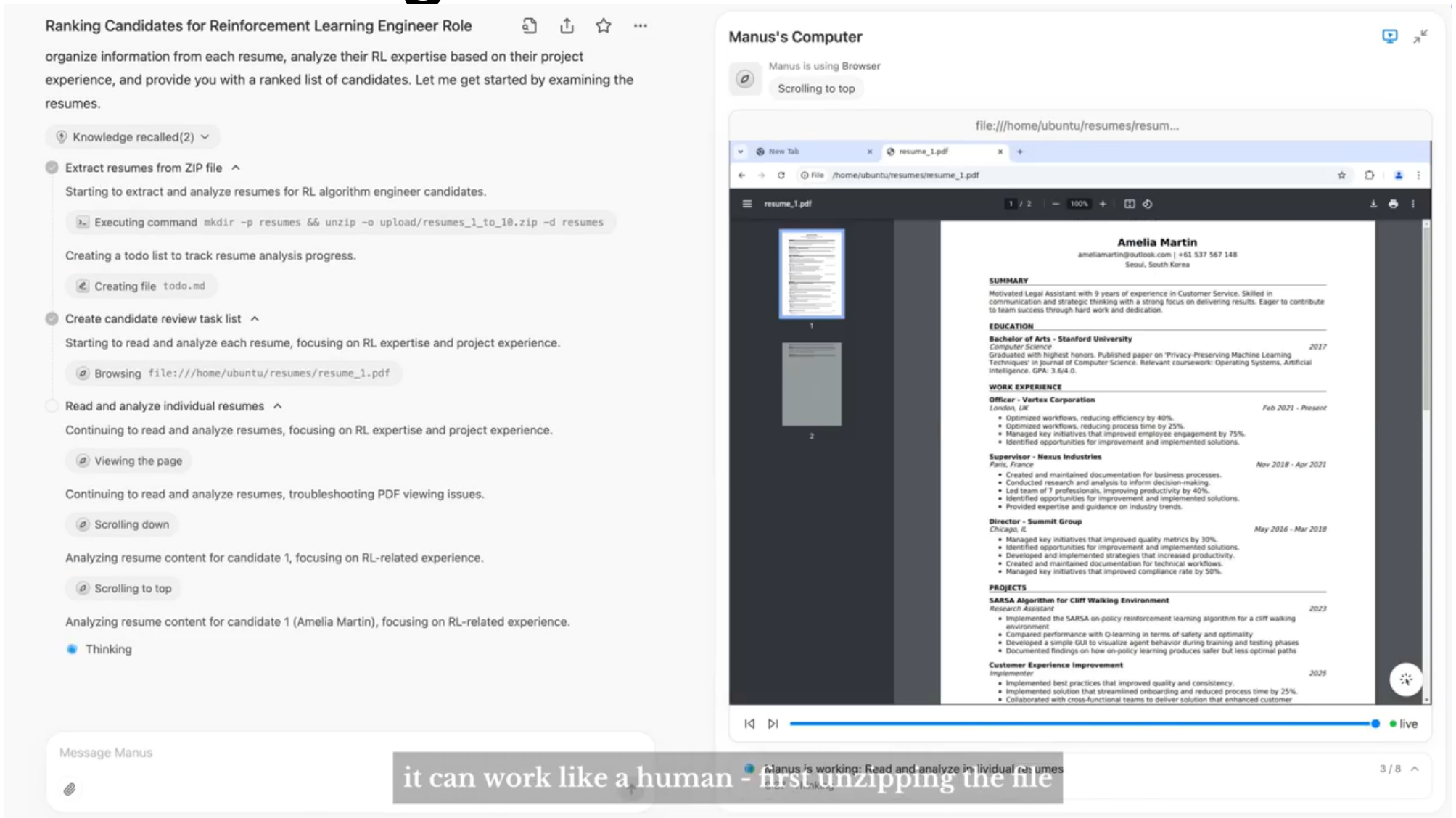
- **Autonomy:** Ability to initiate and complete tasks with limited direct human supervision, with great flexibility and efficiency in executing tasks
- **Reasoning:** Sophisticated decision-making based on context and trade-offs
- **Reinforcement Learning:** Dynamically evolve by interacting with their environment and receiving feedback from these interactions.
- **Language Understanding:** Capacity to understand and follow complex instructions
- **Workflow Optimization:** Efficient execution of multi-step complex processes

Feature	Agentic AI	Generative AI	Traditional AI
Primary Function	Goal-oriented action & decision-making	Content generation (text, code, images, etc.)	Focused on automating repetitive tasks
Autonomy	High – Operates with minimal human oversight	Variable – May require user prompts or guidance	Low – Relies on specific algorithms and set rules
Learning	Reinforced Learning – Improves through experience	Data-driven learning – Learns from existing data	Relies on predefined rules and human intervention



https://aisera.com/blog/agentic-ai/

Agentic AI – Manus AI



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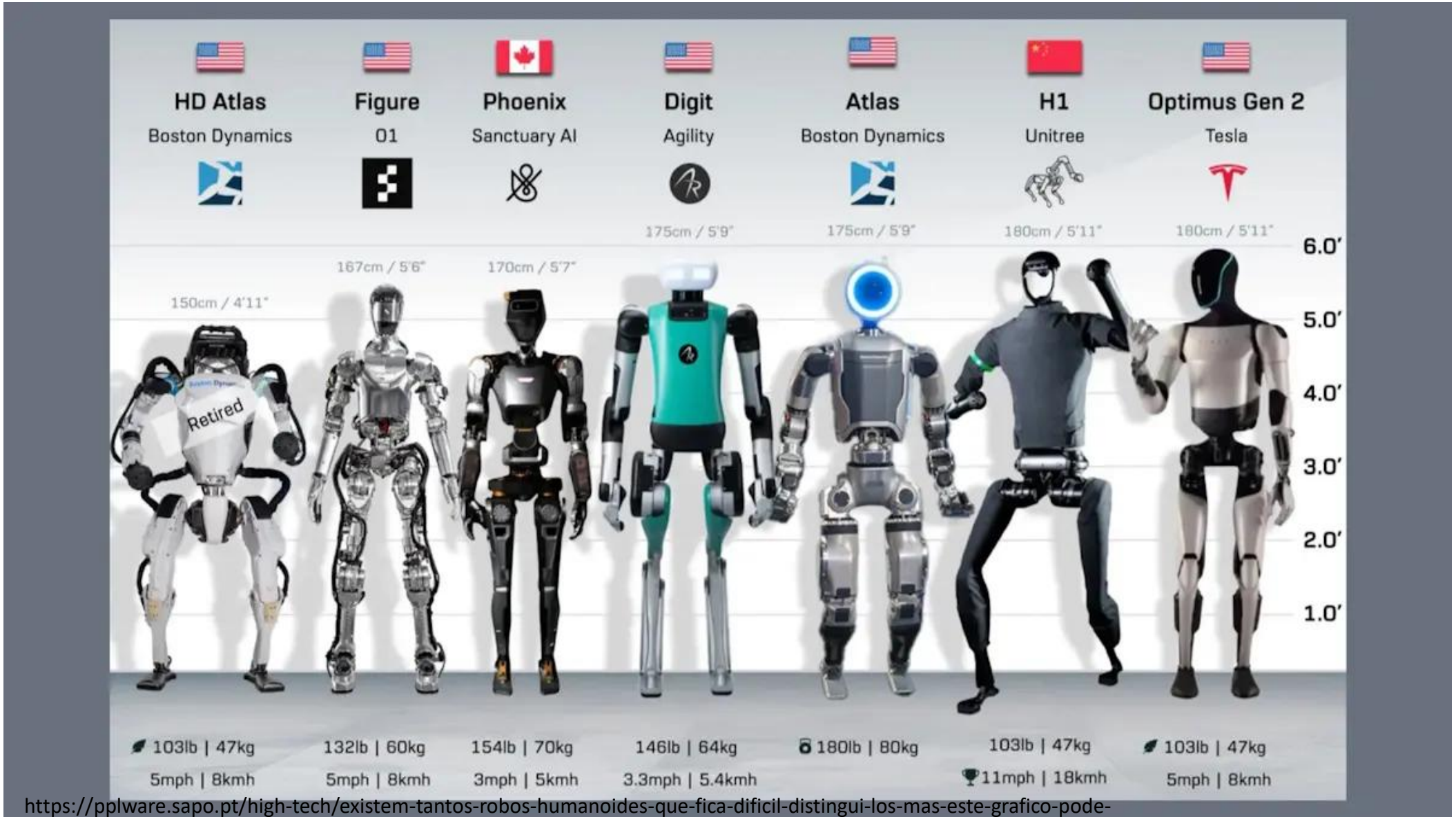
Robotic Humanoids

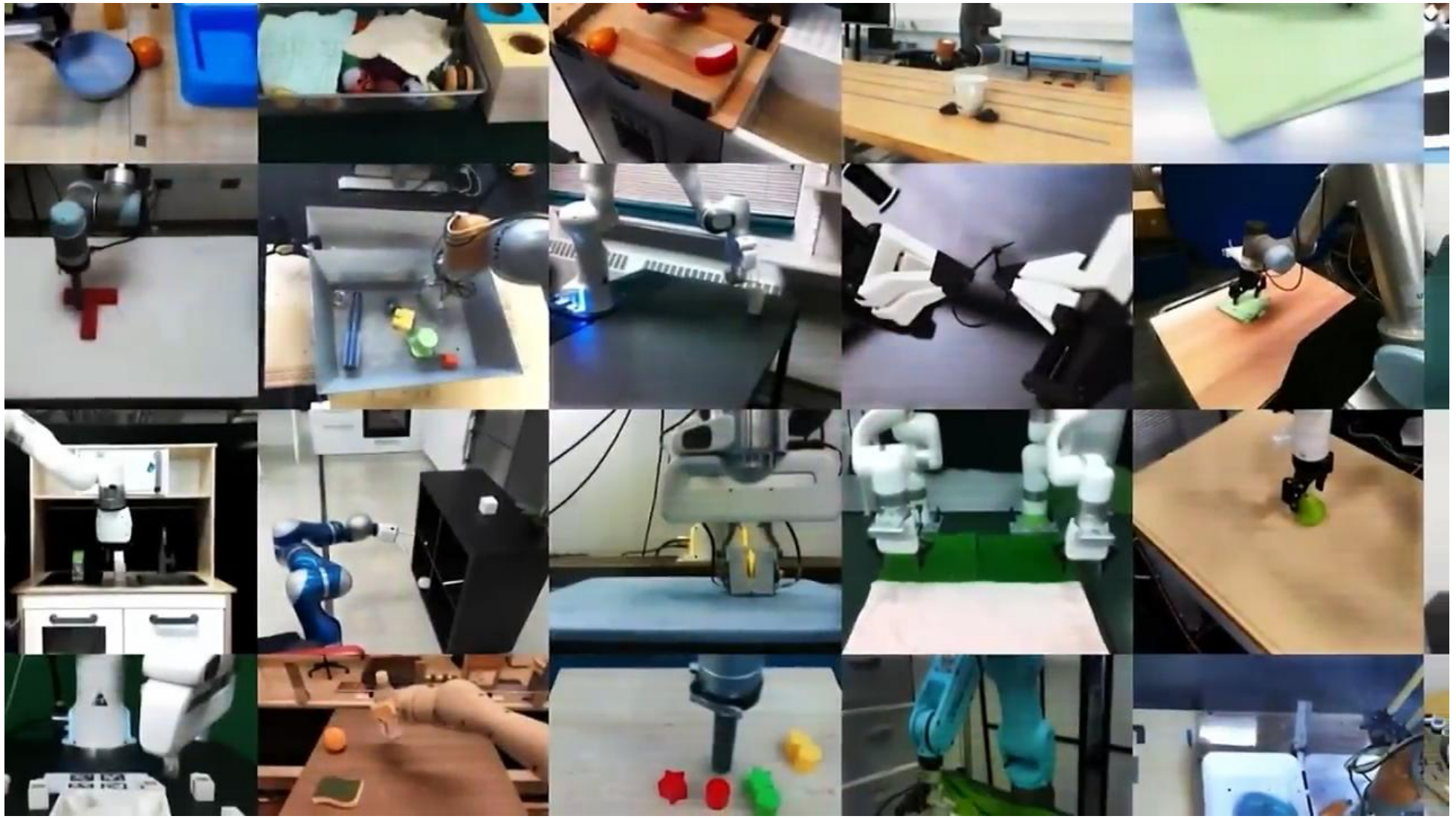


https://pplware.sapo.pt/high-tech/existem-tantos-robos-humanoides-que-fica-dificil-distingui-los-mas-este-grafico-pode-ajudar/?fbclid=IwY2xjawI1Zg9leHRuA2FlbQIxMQABHS_EdekrvewLEgIyq3RZRfPy-HaU4MdNtaFgqa6bT2lkcoYfBoF_Jkqd9w_aem_RO6nDQ16bQJ51jD6bM6-TQ

Large Behavior Models - LBMs

- **LBMs** go beyond processing language. They're designed to **interpret, predict, and generate complex sequences of human-like actions and behaviors**
- While LLMs focus on text and dialogue, LBMs specialize **in behavioural patterns**, **decision-making** processes, and **interactive scenarios**
- LLMs try to guess the next word, while **LBMs try to guess the next action or behaviour**
- LBMs are enhancing robots' abilities to move naturally and respond intuitively to their surrounding
- LBMs rely on:
  - **Transformer Architecture**: Similar to LLMs but adapted to handle sequences of actions/behaviours
  - **Multi-Modal Learning:** Integrating visual, spatial, and temporal data to enhance understanding
  - **Reinforcement Learning:** Learning from interactions and feedback to improve behavior over time

Large Behavior Models – LBMs – RT-X



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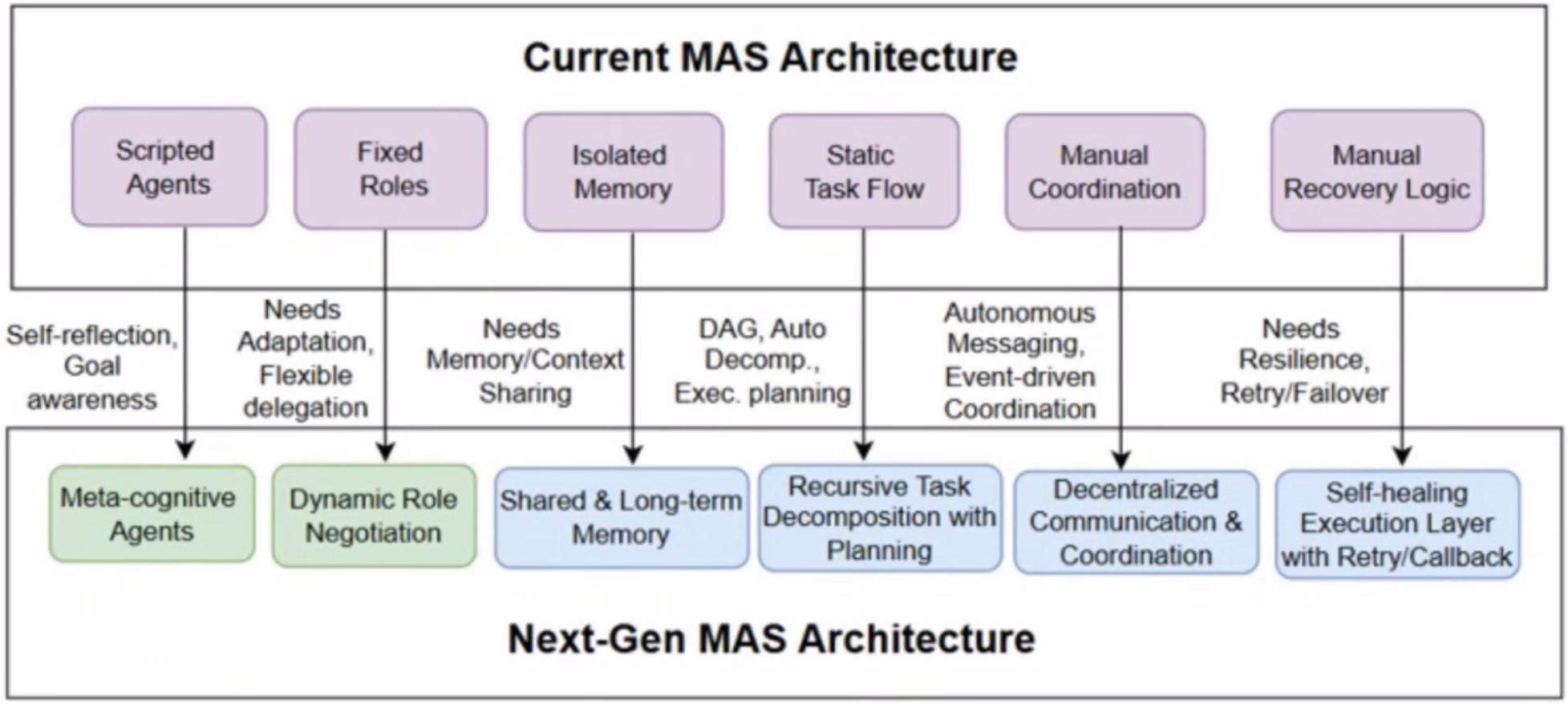
From Agentic AI to Multi-Agent Systems

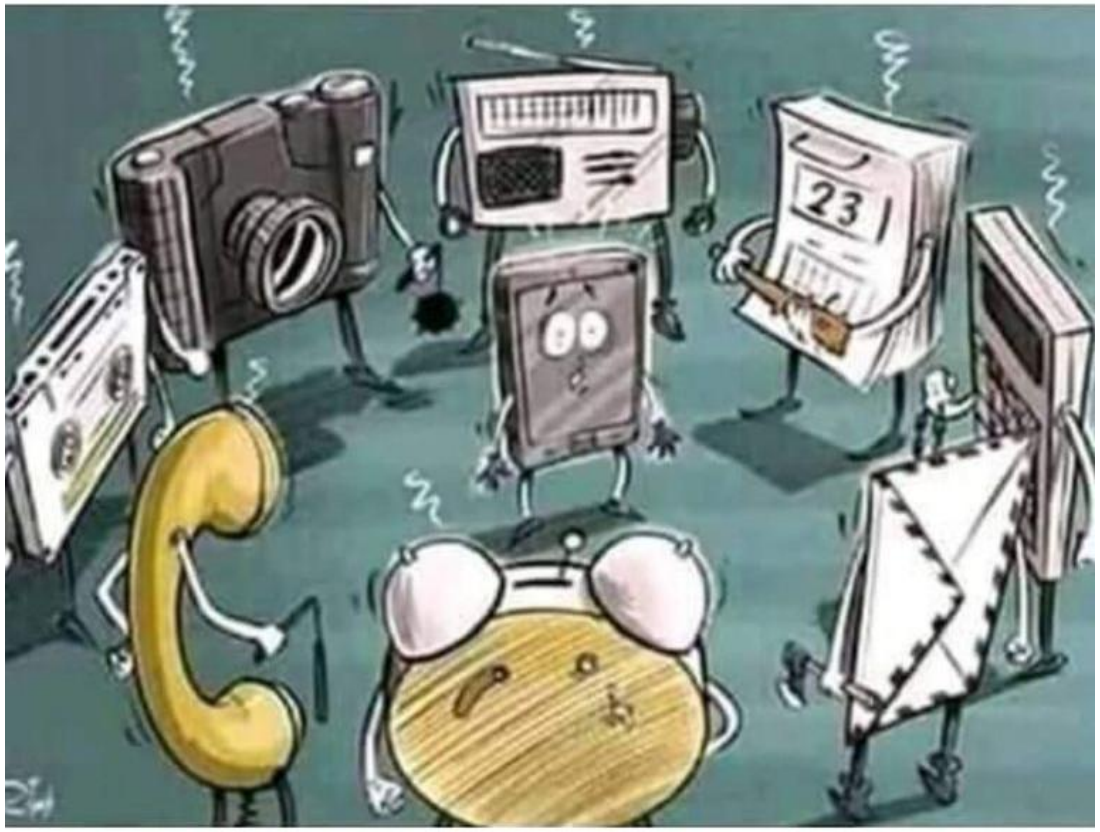


Soharab Hossain Shaikh, IJCCI, 2025

Technology: Adapt or Resist?!

- COVID-19 - Use of technology
- Educate New Generations
- Ethical Use
- Technical Use
- AI Policy
- Prompt Engineering

So! You are the guy…



That took all of our Jobs!

Jobs Most at Risk of Disappearance

Repetition Disappears. Creativity Remains!

Category	Examples of Vulnerable Jobs	Main Reason
Routine cognitive work	Data-entry clerks, bookkeeping assistants, basic translators, call-center operators	LLMs and automation tools now handle structured language, classification, and documentation with high accuracy.
Repetitive manual labor	Assembly-line workers, packaging operators, basic machine operators	Robotics and computer-vision systems enable continuous, precise, and low-cost automation.
Basic administrative support	Scheduling assistants, document clerks, travel agents	Intelligent assistants automate planning, documentation, and coordination tasks.
Customer support (scripted)	FAQ operators, first-level support agents	Conversational AI and voicebots deliver standardized and context-aware responses instantly.
Low-complexity analytical tasks	Junior analysts, simple report writers	Auto-analytics tools and dashboard generators convert raw data into insights automatically.
Basic digital & programming tasks	Programmers, basic web developers, software-test assistants, data-cleaning technicians	Generative-AI coding assistants (e.g., Copilot, ChatGPT) now produce and debug code, run unit tests, and generate documentation autonomously.

Emerging High-Value Roles in the AI Economy

Hybrid experts who can make AI systems reliable, explainable, and human-compatible!

Domain	Emerging Roles	Core Human Value
AI Development & Oversight	AI trainer • Explainability engineer • Responsible-AI officer • Model auditor	Ethics • Transparency • Trust
Human–AI Collaboration	Prompt engineer • AI workflow designer • Cognitive-interface architect	Creativity • Context understanding
Industry & Operations	Predictive-maintenance expert • Human–robot collaboration manager • Smart-factory strategist	Technical reasoning • Safety
Robotics & Autonomous Systems	Robot-behaviour designer • Reinforcement-learning specialist • Multi-robot coordination engineer • Human-robot interaction designer • Ethical-autonomy advisor	Embodied intelligence • Trust • Safety by design
Public Sector & Law	Algorithmic-governance advisor • AI-policy analyst • Digital-law specialist	Accountability • Fairness
Education & Health	Learning-analytics expert • Clinical-AI interpreter • Digital-wellbeing coach	Empathy • Human judgment
Society & Communication	AI ethicist • Fact-checking analyst • AI literacy facilitator	Social responsibility • Critical thinking

Reskilling for the AI Era

Skill Domain	Key Skills	Why It Matters
Cognitive & Problem-Solving	Analytical thinking • Complex problem-solving • Systems thinking • Design reasoning • AI-augmented decision-making	As AI automates analysis, humans must focus on framing problems, interpreting outputs, and designing creative, high-impact solutions.
Artificial Intelligence and Robotics	AI and data literacy • Robotics knowledge • Automation design • Human–robot collaboration • Cybersecurity and digital ethics	The new digital baseline requires understanding, supervising, and questioning intelligent systems rather than just using them.
Human & Social Intelligence	Communication • Empathy • Cross-cultural collaboration • Negotiation • Leadership in human–AI teams	Value shifts from execution to empathy, creativity, and trust—areas where humans remain irreplaceable.
Learning & Adaptability	Self-directed learning • Cognitive flexibility • Curiosity • Resilience • Growth mindset	Lifelong learning becomes the central professional competency—learning, unlearning, and relearning at speed.
Ethical, Strategic & Sustainability	Ethical reasoning • Sustainability awareness • Policy & governance literacy • Foresight • Inclusion & social responsibility	Work must align with human and planetary goals—balancing innovation with accountability and long-term vision.

Concerns of AI and ChatGPT in Education

- More **in person exams** and oral assignments
- **Continuous evaluation** of projects
- Help students **develop** their **critical thinking skills** by comparing AI-produced content with reliable, valid sources of information
- Be careful with **over-reliance on AI**
- Shift the object of evaluation **from the "product" to** the **"process" of student learning**
- Emphasize **ethical use of AI** and the importance of proper research and citation practices and avoiding plagiarism

Changing Role/New Skills for the Teacher

From Knowledge Transmitter → Learning Architect

- Teachers evolve from information deliverers to curators and facilitators
- **Designers of AI-enhanced learning experiences,** integrating adaptive systems and data-driven insights
- Need for **AI pedagogical literacy** – understanding how **AI supports**, not replaces, **learning**
- **Ethical and responsible** use of AI in the classroom (bias, privacy, transparency)
- **Human judgment** remains essential to interpret, contextualize, and emotionally support students
- **Teachers as mentors of critical and creative thinking**, helping students question AI outputs
- Collaboration with AI systems to create **personalized** yet **human-centered education**
- **Continuous professional development** in digital pedagogy and emotional intelligence

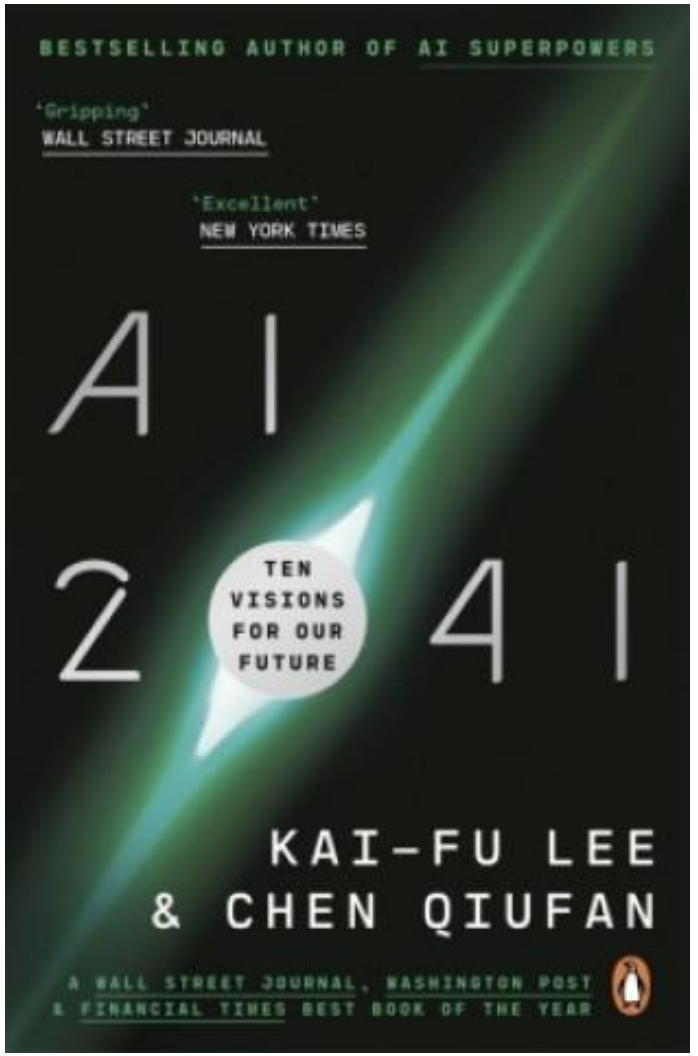
Changing Role/New Skills for Students

From Memorization → Cognitive Adaptation in the Age of AI

- Beyond calculation and memorization: focus on **reasoning, abstraction, and problem framing**
- **Prompt engineering and critical evaluation** of AI-generated solutions
- Developing **AI literacy**: understanding how algorithms work, their limits, and ethical implications
- **Data literacy** — ability to interpret, question, and visualize quantitative information
- **Algorithmic thinking**: breaking problems into logical, computable steps
- **Metacognition** — awareness of how one learns with and without AI support
- **Collaboration with AI systems**: treating **AI as a partner, not a shortcut**
- **Strengthening creativity**, curiosity, and adaptability in problem-solving contexts
- **Ethical and responsible use of AI** in learning and assessment

The Lesson of the Twin Sparrows

- When AI meets Humanity in Learning!
- **Two twin sisters** — same potential, different paths
- One guided by an advanced AI tutor, mastering precision and speed - **AI Learning Partner (AIP)**
- The other supported by a **human teacher,** growing through curiosity and empathy
- Final open challenge:
  - AI-trained twin falters — unable to act without algorithmic guidance
  - Her sister succeeds through intuition, collaboration, and creativity
- Their **teacher, Lixin, realizes…**

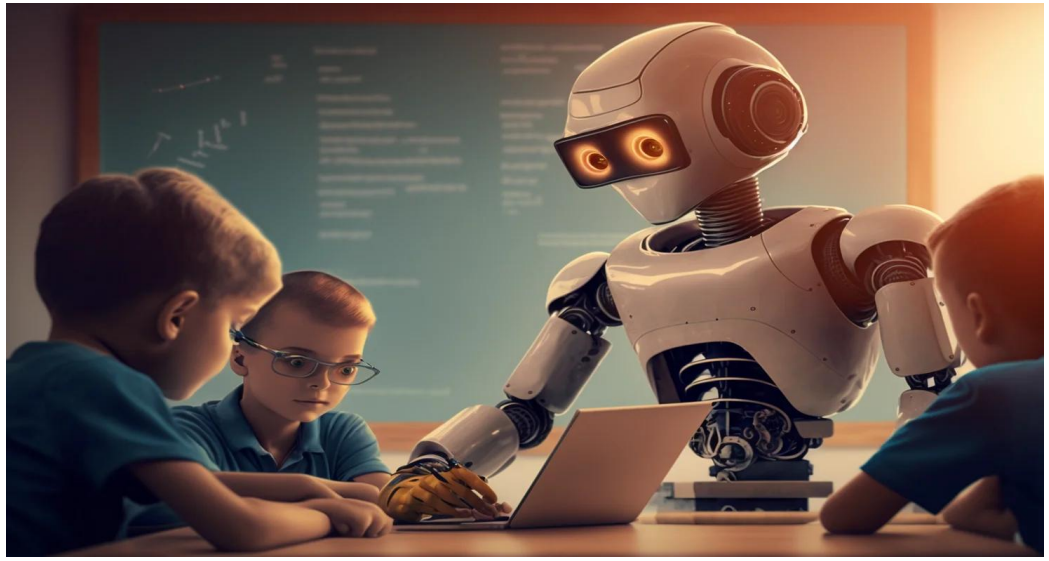


The Lesson of the Twin Sparrows

AI and ChatGPT in Education

“AI and Can Complement Learning, Not Replace It!”

From Knowledge Transmitter → Learning Architect



Concerns of AI and ChatGPT in Research

- Risk of **fabricated** or inaccurate **references and data ("hallucinations")**
- Possible **erosion of methodological rigor** due to **over-reliance** on automated reasoning
- Challenges in ensuring **reproducibility** and **transparency** when **AI is involved**
- Need for explicit **disclosure of AI use** in research design, writing, and analysis
- **Potential bias amplification** from training data and opaque model behavior
- **Ethical responsibility** to validate, interpret, and contextualize **AI outputs** using **human expertise**
- Importance of **maintaining authorship integrity** and **avoiding ghost-writing by AI**

Research with AI

ELSEVIER **Scopus AI**

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Scopus AI: Trusted content. Powered by responsible AI.

Empower your research journey with Scopus AI – your dynamic GenAI-powered research companion.

Navigate through the vast expanse of human knowledge faster with a trusted guide designed to enhance your understanding, enrich your insights, and transform your overall research experience.

Consensus vs ChatGPT

Your AI Research Assistant

scite_

Your AI Research Assistant

Ask questions and receive evidence-based answers from real research

Assistant | Search | Tables

Ask a question... (type '/' for menu)

Settings | Sources

ResearchRabbit

Elsevier's Five Responsible AI Principles

- We consider the real-world impact of our solutions on people
- We take action to prevent the creation or reinforcement of unfair bias
- We can explain how our solutions work
- We create accountability through human oversight
- We respect privacy and champion robust data governance

Ask a research question to generate a concise summary report

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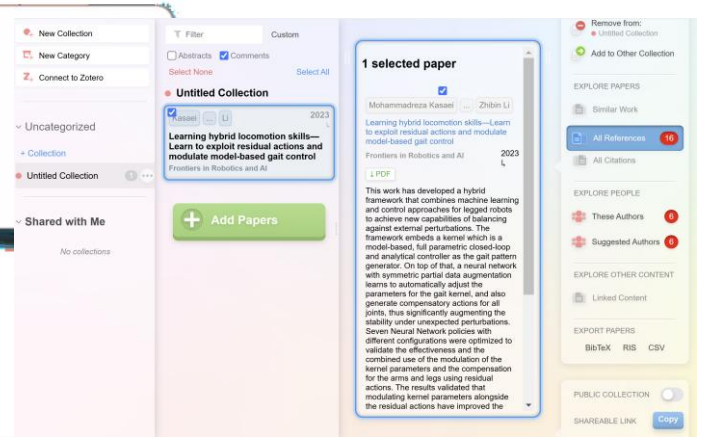
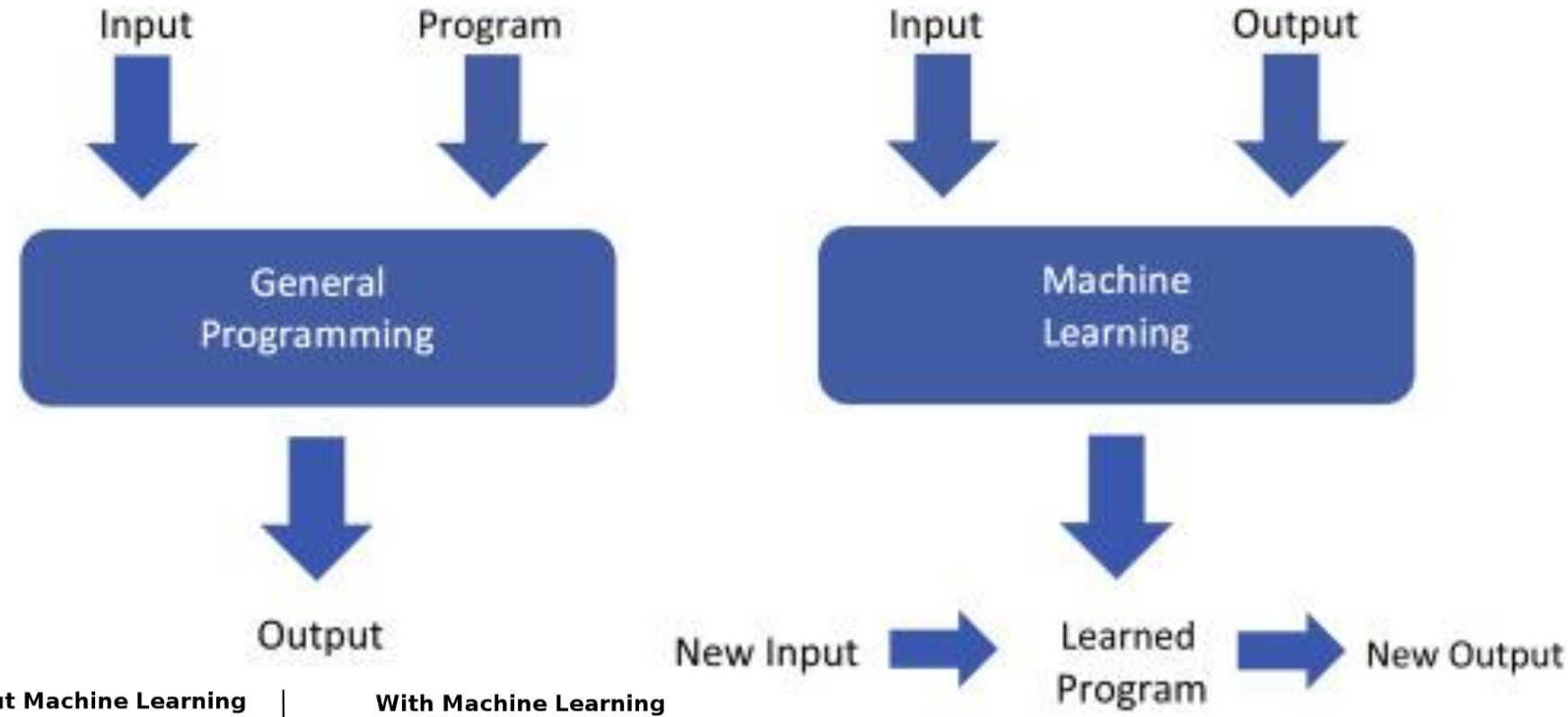
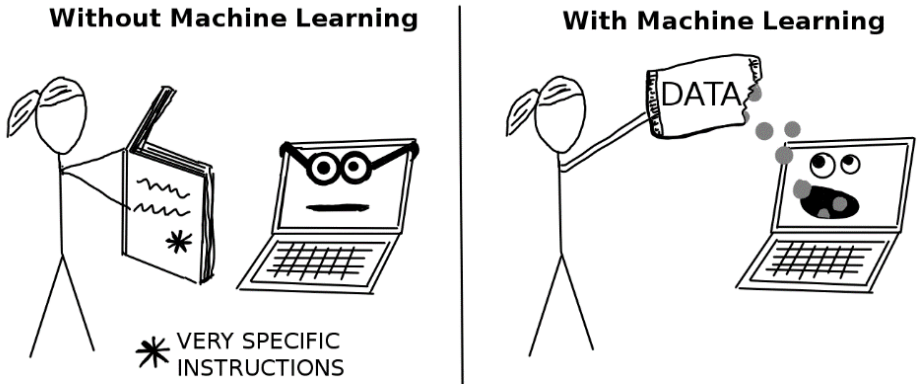


Programming vs Machine Learning





The End of Programming!

Nvidia CEO predicts the death of coding — Jensen Huang says AI will do the work, so kids don't need to learn

News By Benedict Collins published February 26, 2024

Jensen Huang believes coding languages are a thing of the past

(Image credit: Nvidia)

Nvidia CEO Jensen Huang has once again announced the death of coding, but this time in front of a potentially far more influential audience.

StarCoder 2 is a code-generating AI that runs on most GPUs

Kyle Wiggers @kyle_l_wiggers / 2:00 PM UTC • February 28, 2024 Comment

Image Credits: Tippapatt / Getty Images

Developers are adopting AI-powered code generators — services like GitHub Copilot and Amazon CodeWhisperer, along with open access models such as Meta's Code Llama — at an astonishing rate. But the tools are far from ideal. Many aren't free. Others are, but only under licenses that preclude them from being used in common commercial contexts.

Perceiving the demand for alternatives, AI startup Hugging Face several years ago teamed up with ServiceNow, the workflow automation platform, to create StarCoder, an open source code generator with a less restrictive license than some of the others out there. The original came online early last year, and work has been underway on a follow-up, StarCoder 2, ever since.

StarCoder 2 isn't a single code-generating model, but rather a family. Released today, it comes in three variants, the first two of which can run on most modern consumer GPUs:

- A 3-billion-parameter (3B) model trained by ServiceNow
- A 7-billion-parameter (7B) model trained by Hugging Face
- A 15-billion-parameter (15B) model trained by Nvidia, the newest supporter of the StarCoder project

2025 International Collegiate Programming Contest

Rank	University	Country	Solved	Time
1	St. Petersburg State University	Russia	11	1478
2	The University of Tokyo	Japan	10	1116
3	Beijing Jiaotong University	China	10	1425
4	Tsinghua University	China	9	865
5	Peking University	China	9	887
6	Harvard University	USA	9	995
7	University of Zagreb	Croatia	9	1075
8	Massachusetts Institute of Technology	USA	9	1123
9	University of Science and Technology of China	China	9	1128
10	Seoul National University	Korea	9	1133
11	University of Novi Sad	Serbia	9	1175
12	Saratov State University	Russia	9	1191
13	Karlsruhe Institute of Technology	Germany	9	1199
14	University of Maryland	USA	9	1239
15	National Taiwan University	Taiwan	9	1256
16	Sharif University of Technology	Iran	9	1329
17	Arizona State University	USA	9	1331
18	HSE University	Russia	8	653
19	Carnegie Mellon University	USA	8	766
20	University of Illinois Urbana-Champaign	USA	8	774

OpenAI and Google DeepMind Outshine Students at World's Top Coding Contest

Published September 18, 2025 | Written by  Liz Ticong

OpenAI scored a flawless 12/12 and Google DeepMind struck gold at ICPC 2025, the world's toughest programming contest for top university teams.

Mostafa Rohaninejad ✓
@MostafaRohani

2/n
We officially competed in the onsite AI track of the ICPC, with the same 5-hour time limit to solve all twelve problems, submitting to the ICPC World Finals Local Judge - judged identically and concurrently to the ICPC World Championship submissions. We received the problems in the exact same PDF form, and the reasoning system selected which answers to submit with no bespoke test-time harness whatsoever. For 11 of the 12 problems, the system's first answer was correct. For the hardest problem, it succeeded on the 9th submission. Notably, the best human team achieved 11/12.

	A	B	C	D	E	F	G	H	I	J	K
AI	88 1 try	104 1 try	56 1 try	23 1 try	58 1 try	40 1 try	241 9 tries	60 1 try	58 1 try	74 1 try	70 1 try

Coding Applications – Practical Example

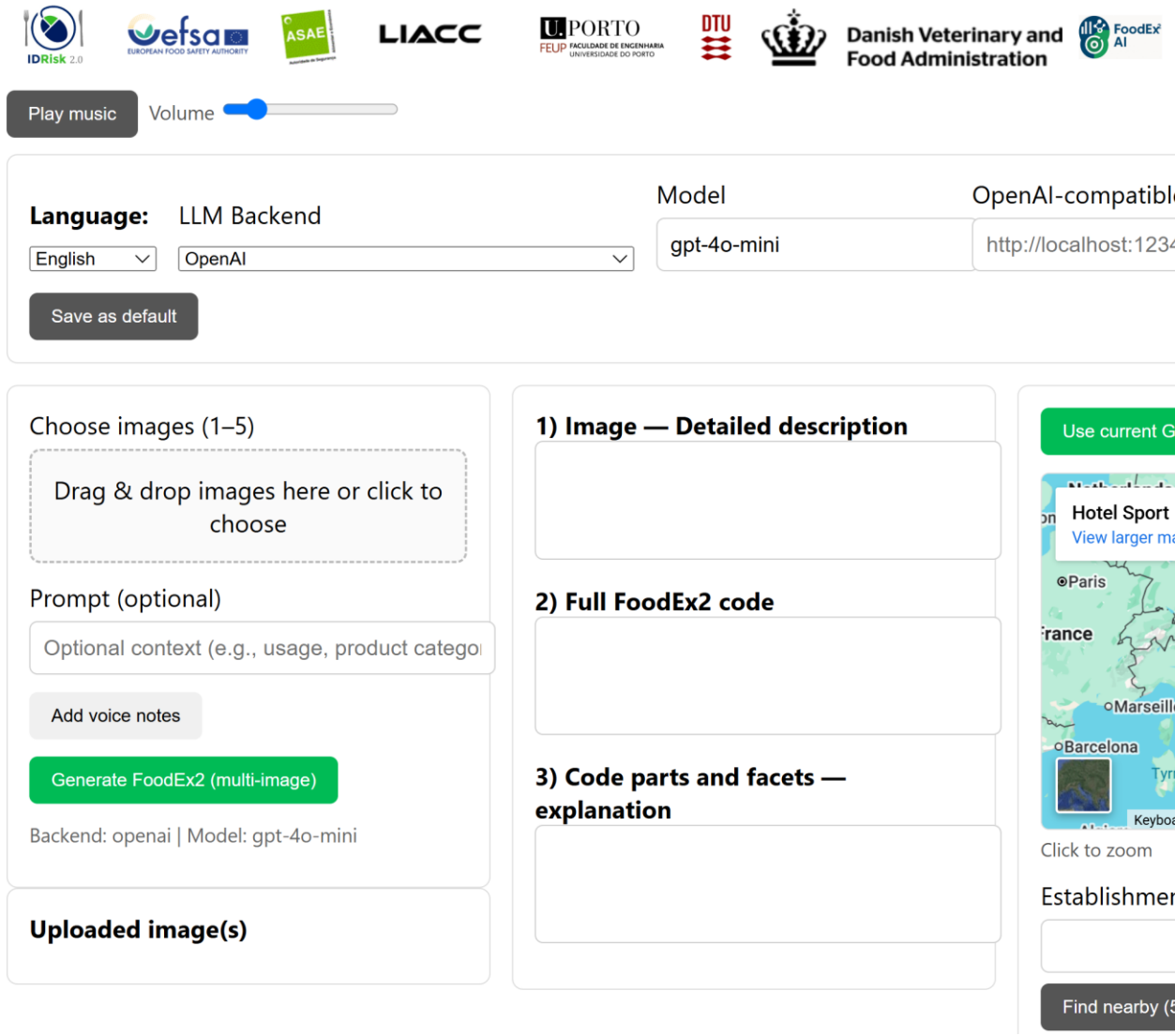
GitHub Copilot

GitHub Copilot

OpenAI Codex

Gemini

Claude



Conclusions

- **AI** has become a **Partner no longer a Tool**
- **LLMs, Agentic AI, LBMs,** New **GenAI** and **DRL Robots**
- **AI will not replace humans — but humans who use AI will replace those who don't**
- AI transforms **work** into **higher-value, creative,** and **human-centered** roles
- **Success** depends on **synergy** between **research, education, policy, industry** and **society**
- Our **challenge** is to **ensure AI Grows With Us, Not Against Us!**

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