



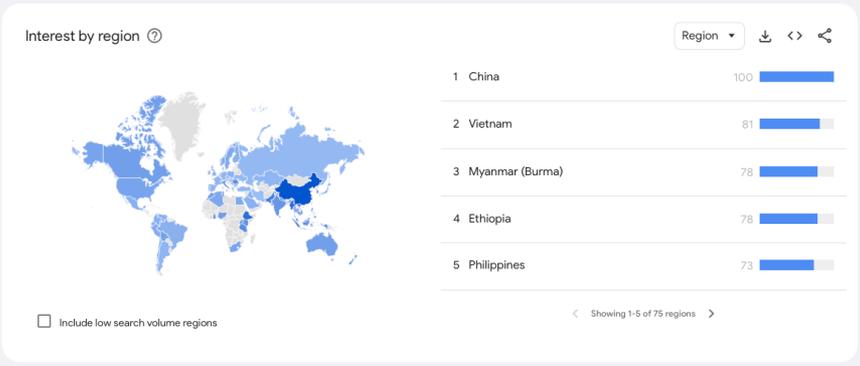
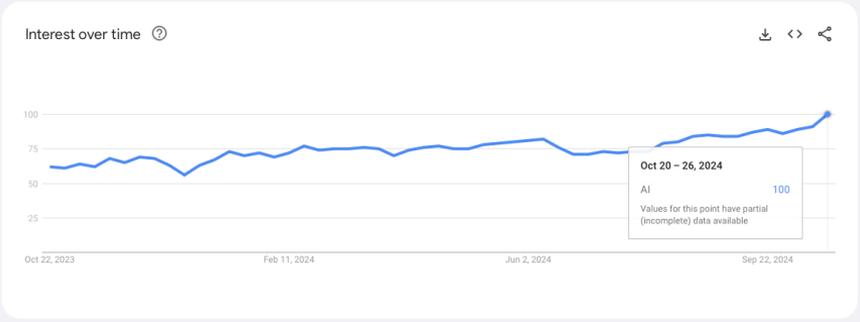
ARTIFICIAL INTELLIGENCE: Yesterday, Today, and Tomorrow

Dr. KHUN Kimang

Cambodia Youth Internet Governance Forum 2024,
CKCC Phnom Penh, November 2024

● AI Search term + Compare

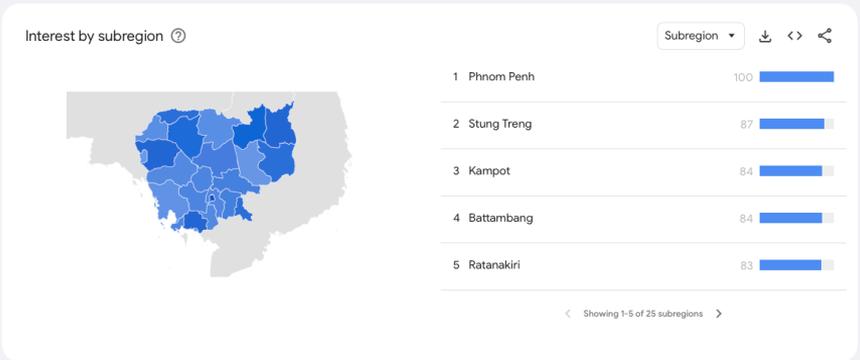
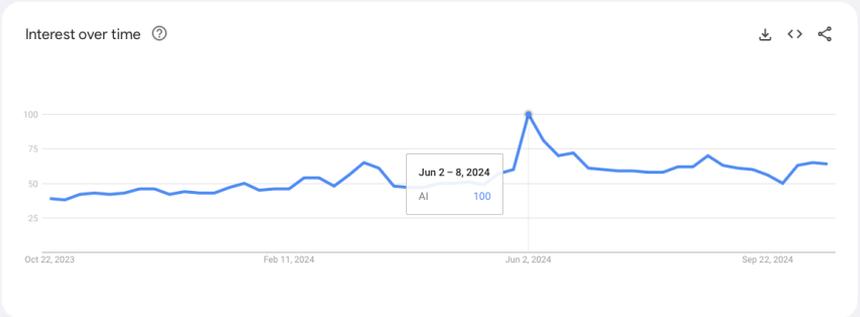
Worldwide Past 12 months All categories Web Search



● AI
Search term

+ Compare

Cambodia Past 12 months All categories Web Search





MarTech · Follow

17 October at 09:13

វគ្គបណ្តុះបណ្តាល "ជំនាញប្រើឧបករណ៍បញ្ជាសិប្បនិម្មិត (AI) ក្នុងបដិវត្តន៍ឧស្សាហកម្ម5.0"

អ្វីដែលលោកអ្នកទទួលបាន៖

- 📍 សិក្សាបដិវត្តន៍ឧស្សាហកម្ម5.0
- 📍 សិក្សាអ្វីជាបញ្ជាសិប្បនិម្មិត (AI) និង គំរូ2500 ChatGPT Prompt
- 📍 ប... See more



Apsara Media Services · Follow

17 September

បទឆ្លើយឆ្លង៖ ឥទ្ធិពលបញ្ជាសិប្បនិម្មិត (AI) មកលើគ្រូបង្រៀនកម្ពុជា

#apsaratonight #Apsaratv11 #Apsaramediaservice #Amscentral #ApsaraFM97 #ApsaraFM99



Alynana and LNN

6 days ago

អ្នកជំនាញ៖ ពន្យល់អត្ថន័យនៃ «បញ្ជាសិប្បនិម្មិត» និងការវិវត្តន៍ខ្លួនកម្ពុជាទៅរកបញ្ជាសិប្បនិម្មិត— and LNN

JOIN LNN News: <https://t.me/lnnkh>— and LNN



Mengly J. Quach

25 September at 19:27

ភាពជឿនលឿននៃបញ្ជាសិប្បនិម្មិត (AI) នឹងជះឥទ្ធិពលអាក្រក់ដល់វិស័យអប់រំឬទេ?

ទស្សនាវីដេអូលើ YouTube៖ <https://youtu.be/UrcNKRDnd8g>

ទស្សនាវីដេអូលើ Facebook៖ <https://www.facebook.com/watch/?v=1628091818083146...> See more



ស៊ីស៊ីថាមស៍ · Follow

6 days ago

អ្នកជំនាញ៖ ពន្យល់អត្ថន័យនៃ «បញ្ជាសិប្បនិម្មិត-AI» និងការវិវត្តន៍ខ្លួនកម្ពុជាទៅរកបញ្ជាសិប្បនិម្មិត

#ស៊ីស៊ីថាមស៍ #AI #ក្រសួងប្រៃសណីយ៍និងទូរគមនាគមន៍



Sabay News · Follow

15 October at 09:20

សិក្ខាសាលាស្តីពីបដិវត្តកម្មបញ្ជាសិប្បនិម្មិត និងយុទ្ធសាស្ត្រគ្រូបង្រៀនខ្លួនសម្រាប់អនាគត



TABLE OF CONTENTS

01

WHAT IS AI?

In which we try to describe existing definitions of AI before embarking.

02

HISTORY OF AI

In which we try to recall existing key events related to AI

03

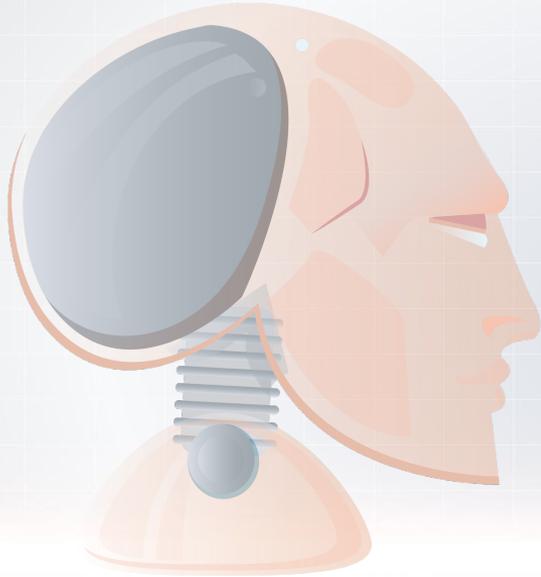
FUTURE OF AI

In which we consider potential opportunities of AI

01

WHAT IS AI?

Understanding the foundations of
Artificial Intelligence



There are 4 Schools of Thought.

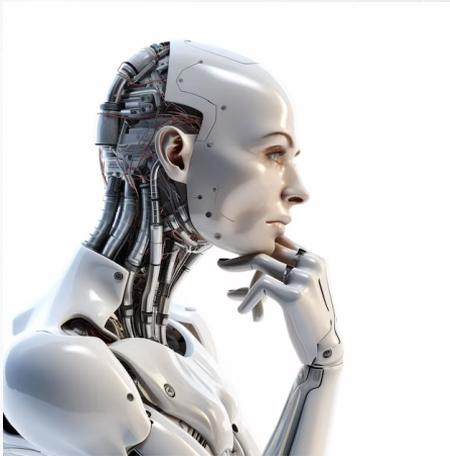
	Humanly	Rationally
Thoughts	Thinking humanly	Thinking rationally
Behavior	Acting humanly	Acting rationally



AI FARM ROBOTICS

Thinking Humanly: Cognitive Modeling Approach

AI = computer systems that **think like a human**.



Thinking Humanly: Cognitive Modeling Approach

AI = computer systems that **think like a human**. But how human thinks?



Thinking Humanly: Cognitive Modeling Approach

AI = computer systems that **think like a human**.

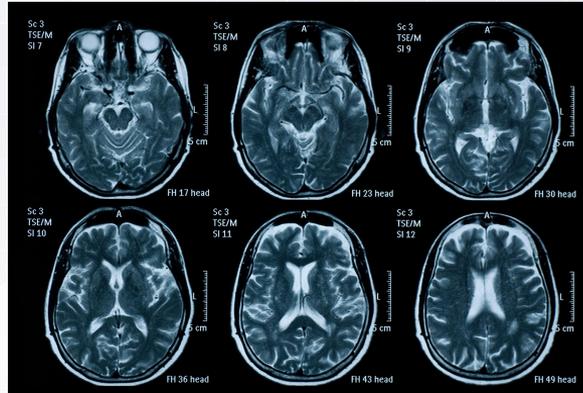
- Introspection – trying to catch our own thoughts as they go by;



Thinking Humanly: Cognitive Modeling Approach

AI = computer systems that **think like a human**.

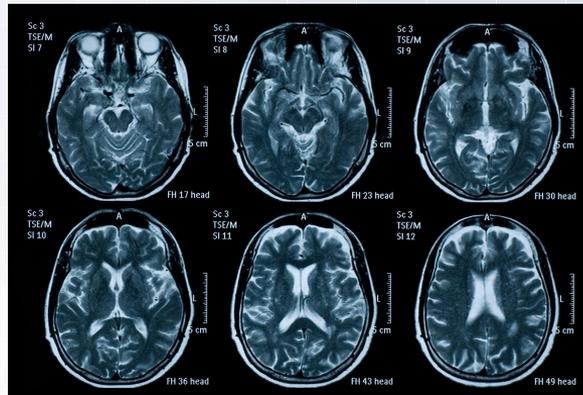
- Introspection – trying to catch our own thoughts as they go by
- Brain imaging – observing the brain in action



Thinking Humanly: Cognitive Modeling Approach

AI = computer systems that **think like a human**.

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Thinking Humanly: Cognitive Modeling Approach

AI = computer systems that **think like a human**.

- Introspection – trying to catch our own thoughts as they go by
- Brain imaging – observing the brain in action

With precise theory of mind, it is possible to

- Create AI to have **natural interaction** with human
- Understand human behavior and psychology more

Thinking Rationally: Laws of Thought Approach

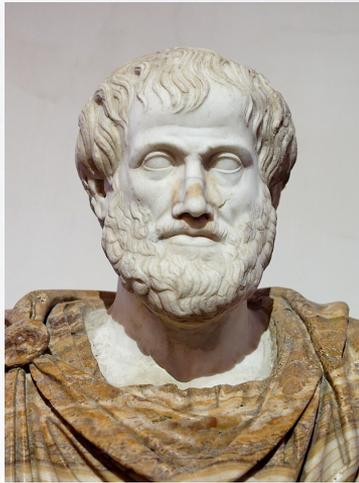
AI = computer systems that **think logically**.





Thinking Rationally: Laws of Thought Approach

AI = computer systems that **think logically**.



Aristotle

All **human** are **mortal**. (stated)

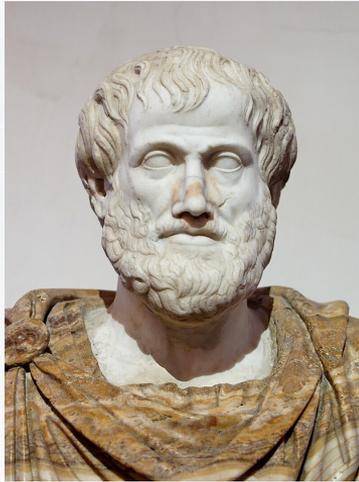
All **Greeks** are **human**. (stated)

All **Greeks** are **mortal**. (deduced)



Thinking Rationally: Laws of Thought Approach

AI = computer systems that **think logically**.



Aristotle

All **human** are **mortal**. (stated)

All **Greeks** are **human**. (stated)

All **Greeks** are **mortal**. (deduced)

“... in which, certain things being stated, something other than what is stated follows of necessity from their being so.”¹

¹ Aristotle, Prior Analytics, Book I, written circa 350 bce, translated by A. J. Jenkinson, Web addition published by eBooks@Adelaide, available online at <http://etext.library.adelaide.edu.au/a/aristotle/a8pra/>.



AI FARM ROBOTICS

Thinking Rationally: Laws of Thought Approach

AI = computer systems that **think logically**.

- “laws of thought” are “the operations in mind”
- Initiate the field of **logic** (inference, deduction, induction, etc.,)



Thinking Rationally: Laws of Thought Approach

AI = computer systems that **think logically**.

- “laws of thought” are “the operations in mind”
- Initiate the field of **logic** (inference, deduction, induction, etc.,)

Logical inference helps

- Create AI that should have **goal-oriented** behavior
- Create AI that avoids **inconsistencies** and **contradictions** in its reasoning

Acting Humanly: The Turing Test Approach

AI = computer systems that **behave like a human**.



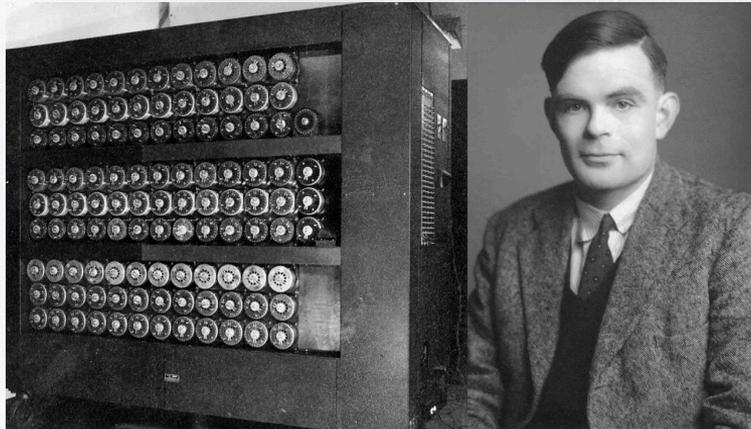


Acting Humanly: The Turing Test Approach

AI = computer systems that **behave like a human**.

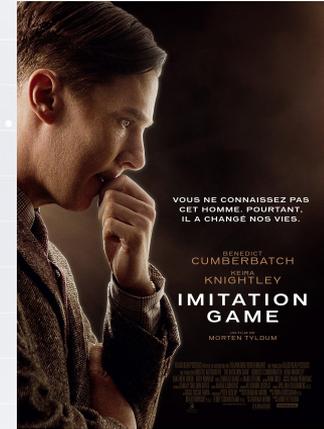
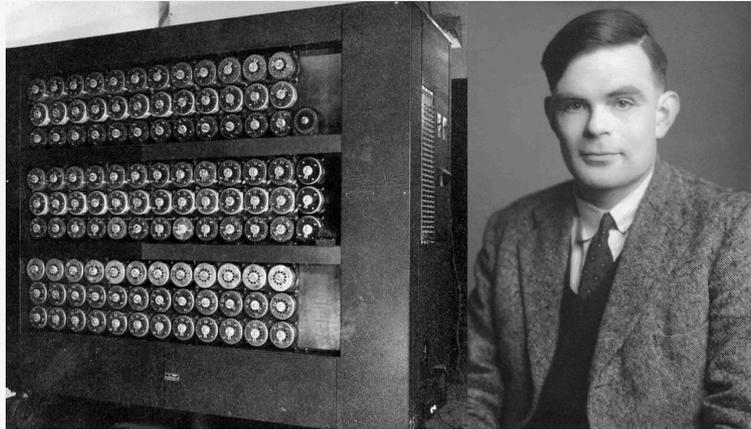
In Alan Turing's article (1950), a test, now called **Turing Test**, is proposed to settle the matter of machine intelligence: **behave humanly**.

Alan Turing, the father of theoretical computer science.



1936: Alan Turing (1912-1954)
and the Turing Machine.

Alan Turing, the father of theoretical computer science.

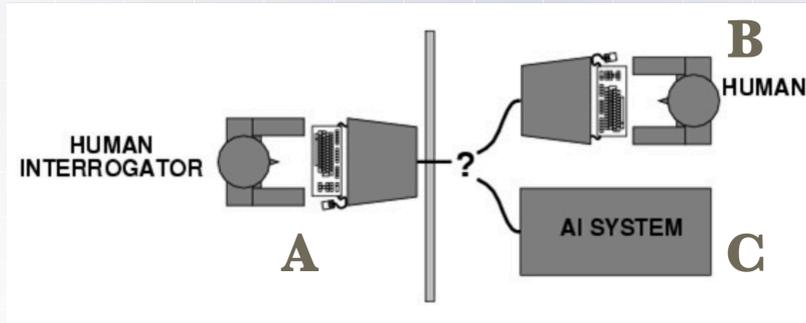


Imitation Game

Acting Humanly: The Turing Test Approach

AI = computer systems that **behave like a human**.

In Alan Turing's article (1950), a test, now called **Turing Test**, is proposed to settle the matter of machine intelligence: **behave humanly**.



Turing Test: A must decide:

1. **B** is human and **C** is AI
2. **B** is AI and **C** is human.



Acting Humanly: The Turing Test Approach

AI = computer systems that **behave like a human**.

Total Turing Test: require **computer vision** and **speech recognition** to perceive information and **robotics** to interact.

Acting Humanly: The Turing Test Approach

AI = computer systems that **behave like a human**.

Total Turing Test: require **computer vision** and **speech recognition** to perceive information and **robotics** to interact.



Sci-Fi film, released in 2014,
Ava is programmed based on **emotional profile** of Caleb.
Ava manipulates Caleb to help set her free.



Acting Rationally: Rational Agent Approach

AI = computer systems that **behave rationally** – acting to achieve **best outcome** or **best expected outcome**.

- The most general approach
- Goal-oriented – maximize rationality

This approach is the most adopted: in most tasks, **rationality** can be expressed **mathematically**.

Acting Rationally: Rational Agent Approach

Artificial Intelligence

Dartmouth workshop 1956

“The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it.”



Acting Rationally: Rational Agent Approach

Artificial Intelligence

Dartmouth workshop 1956

“The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it.”



Machine Learning

“software applications become more accurate in predicting outcomes without being explicitly programmed to do so.”



Acting Rationally: Rational Agent Approach

Artificial Intelligence

Dartmouth workshop 1956

“The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it.”



Machine Learning

“software applications become more accurate in predicting outcomes without being explicitly programmed to do so.”



Deep Learning

“Use artificial neural network to learn from data.”



**AI = technology performing tasks
once thought exclusively for human.**



AI = technology performing tasks once thought exclusively for human.

- **Communication** – understanding and generate human language



2023 - 2024

2024 - now

Meta

Llama 3



AI = technology performing tasks once thought exclusively for human.

- **Recognition** – understanding pattern such as object detection, facial recognition, etc.,



MobileNet v2



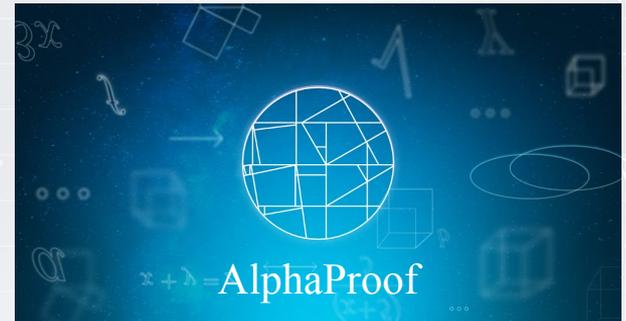
End-to-End Object Detection with Transformers



MediaPipe

AI = technology performing tasks once thought exclusively for human.

- **Strategizing** – playing complex games at a superhuman level such as chess, Go, and solving math problems



AI = technology performing tasks once thought exclusively for human.

- **Making arts** – generating images, music, and videos

DEEPPFAKE



Leonardo.Ai

 DALL·E



Midjourney



AI = technology performing tasks once thought exclusively for human.

- **Communication** – understanding and generate human language
- **Recognition** – understanding pattern such as object detection, facial recognition, etc.,
- **Strategizing** – playing complex games at a superhuman level such as chess, Go
- **Making arts** – generating images, music, and videos

Conclusion

4 approaches that define AI: **1)** Thinking humanly, **2)** Thinking rationally, **3)** Acting humanly, **4)** Acting rationally.

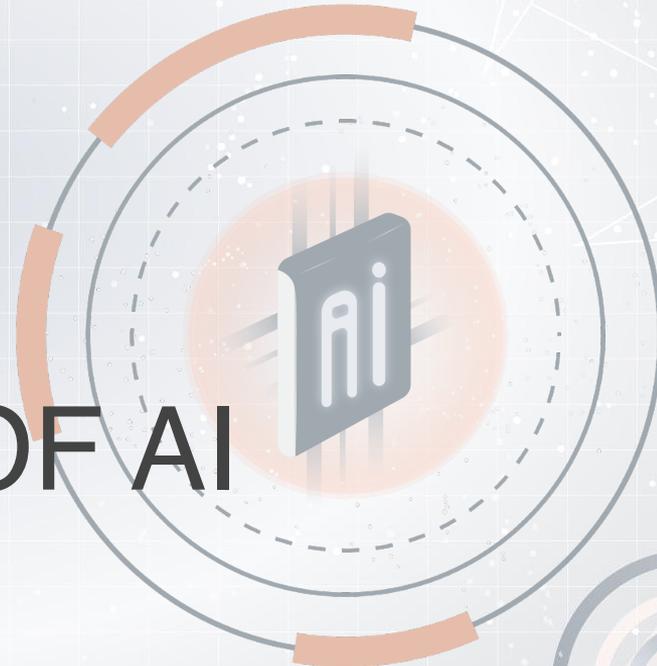
Today, AI is a technology performing human tasks: **1)** communication, **2)** recognition, **3)** strategizing, **4)** generating arts.



02

HISTORY OF AI

The Evolution of AI:
From Early Beginnings
to Breakthroughs

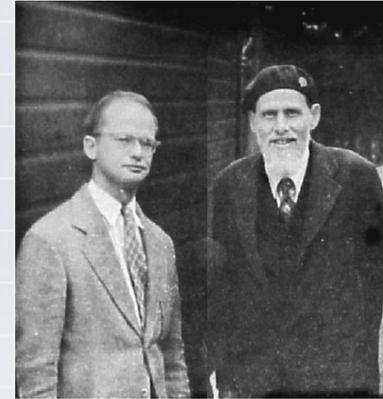
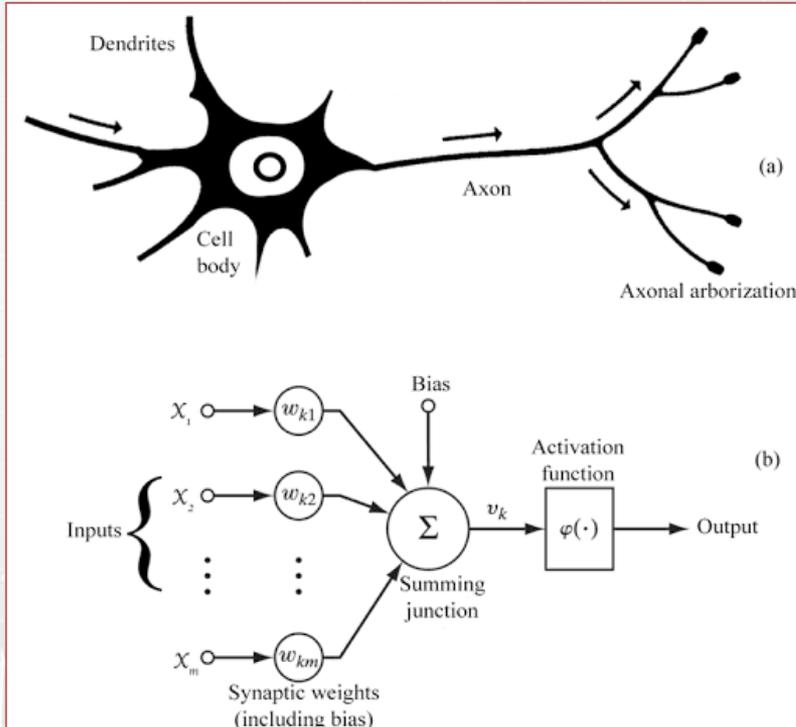




“I believe that at the end of the century the use of words and general educated opinion will have altered so much that one will be able to speak of **machines thinking** without expecting to be contradicted.”

— **Alan Turing**

In 1943, artificial neuron was proposed.



**Pitts and
McCulloch**



In 1950, computing machinery and intelligence was introduced.

VOL. LIX. No. 236.]

[October, 1950

M I N D
A QUARTERLY REVIEW
OF
PSYCHOLOGY AND PHILOSOPHY

I.—COMPUTING MACHINERY AND
INTELLIGENCE

By A. M. TURING

1. *The Imitation Game.*

I PROPOSE to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning

Learning is better than
hand-coded intelligence
programming.

In 1956, the term “Artificial Intelligence” was defined.

“To proceed on the basis of conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it.”





AI FARM ROBOTICS

1956-1980, no major breakthroughs in AI.

- In early 1950, there were great expectations and optimism for AI.
- AI researchers made predictions of their coming successes that hardly come.
- AI systems encountered scarcity of computational resource

This led to **AI Winter** twice, **1974-1980** and **1987-1993**.



From 1986, neural network regains popularity.

- **Frank Rosenblatt** (1958) proposed *multilayer perceptron* with 3 layers.
- **David E. Rumelhart et al.** (1986) popularized *backpropagation*.
- LeNet-5 by **Yann LeCun et al.** (1998) was used by banks to recognize hand-written numbers on checks.

From 1990s, AI research and development boosts again along the breakthroughs of computational capacity (GPU and TPU)

The rise of artificial intelligence over the last 8 decades: As training computation has increased, AI systems have become more powerful



The color indicates the domain of the AI system: ● Vision ● Games ● Drawing ● Language ● Other

Shown on the vertical axis is the training computation that was used to train the AI systems.

10 billion petaFLOP

Computation is measured in floating point operations (FLOP). One FLOP is equivalent to one addition, subtraction, multiplication, or division of two decimal numbers.

100 million petaFLOP

The data is shown on a logarithmic scale, so that from each grid-line to the next it shows a 100-fold increase in training computation.

1 million petaFLOP

10,000 petaFLOP

100 petaFLOP

1 petaFLOP = 1 quadrillion FLOP

10 trillion FLOP

The first electronic computers were developed in the 1940s

1940 1950

1956: The Dartmouth workshop on AI, often seen as the beginning of the field of AI research

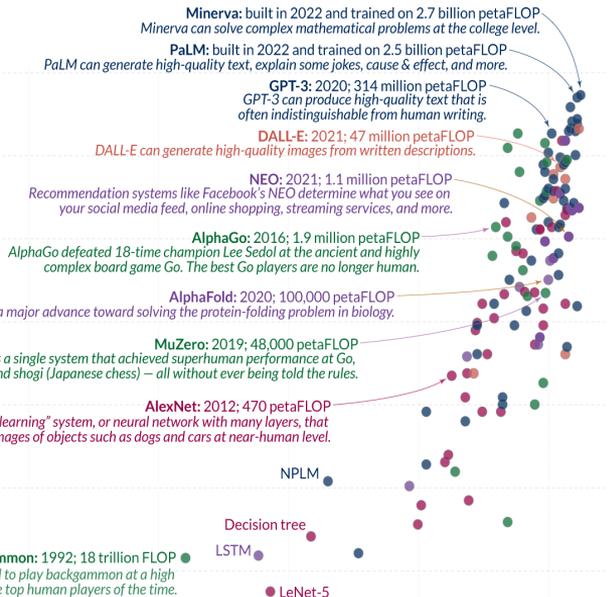
Pre Deep Learning Era
Training computation grew in line with Moore's law, doubling roughly every 20 months.

1960 1970 1980 1990

1997: Deep Blue beats world chess champion Garry Kasparov

Deep Learning Era
Increases in training computation accelerated, doubling roughly every 6 months.

2000 2010 2020



Human-Level Performance Milestones

Boost of AI thanks to

1. Big Data
2. Advanced Algorithms
3. High-Performance Computing (HPC)

03

FUTURE OF AI

What is happening and will happen?

LLMs are the core of current AI technologies

Integrating Large Language Model (LLM) is **the trend** in the software market.

Source: Sequoia

The Generative AI Market Map v3

A work in progress



AI FARM ROBOTICS



ics Factory



AI FARM ROBOTICS

AI evolves exponentially fast!

The evolution of Midjourney:



V1

Feb 2022



V2

Apr 2022



V3

Jul 2022



V4

Nov 2022



V5

Mar 2023



V6

Dec 2023

Prompt: high quality photography of a young Japanese smiling, backlighting, natural pale light, film camera, by Rinko Kawauchi, HDR

Source: Gold Penguin

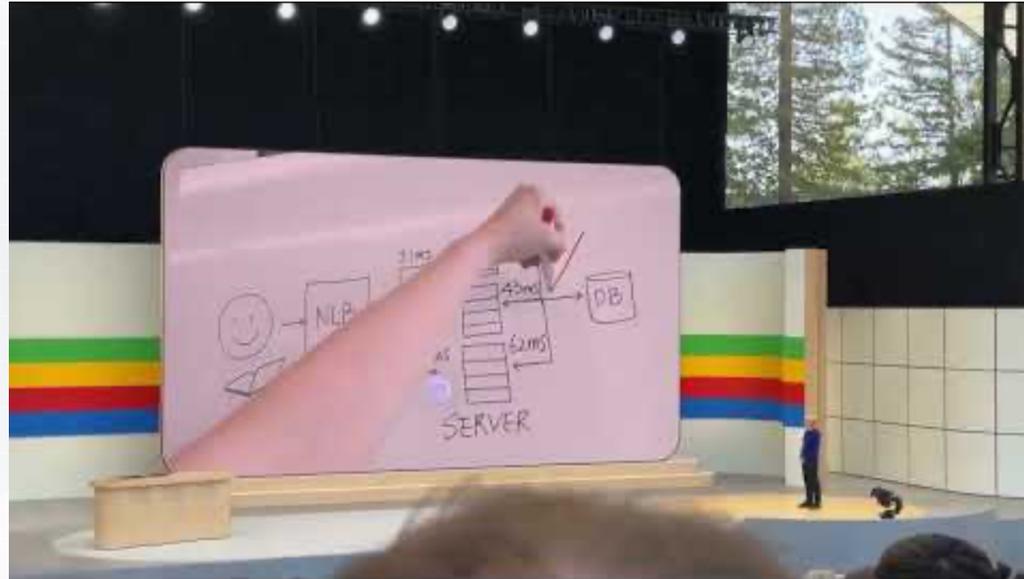
AI Farm Robotics Factory



AI FARM ROBOTICS

AI evolves exponentially fast!

Google Demo of Project Astra at Google I/O 2024





AI FARM ROBOTICS

LLMs are just the **foundation** for what comes next.

- LLMs keep improving in **multimodal, reasoning, planning, decisioning, etc.**
- Wide-scale adoption of LLMs in business bring new opportunities



AI FARM ROBOTICS

AI to Zero or Hero?

Artificial General Intelligence (AGI) has become the mission of tech giants, but by what we have learnt from the past, **AI Winter** is possible.



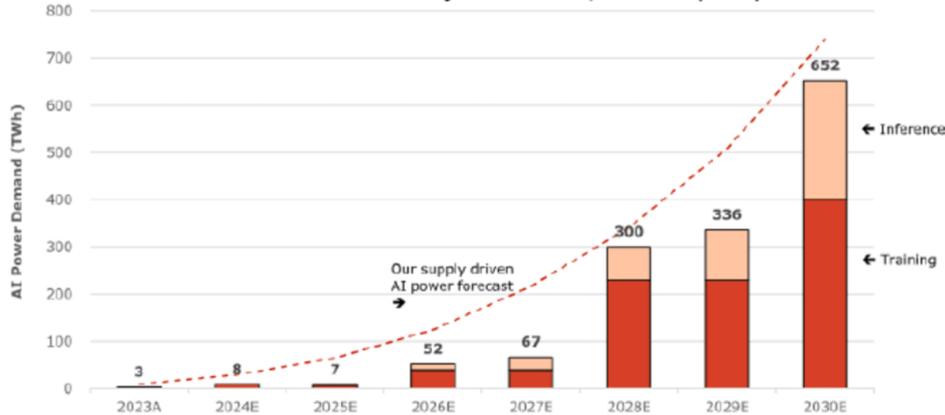
AI FARM ROBOTICS

AI needs zillion of electricity.

Summary of GenAI demand forecast

Source: Wells Fargo

Note: Total US electricity demand – 4,000 TWh (2023)



	2023A	2024E	2025E	2026E	2027E	2028E	2029E	2030E
(+) Training power demand (TWh)	3	8	7	40	40	229	229	402
(+) Inference power demand (TWh)	0	0	0	12	27	70	107	250
Demand driven AI power forecast (TWh)	3	8	7	52	67	300	336	652
Supply driven AI power forecast (TWh)	9	29	65	125	217	341	506	739

Source: Wells Fargo Securities, LLC estimates

1TWh = 10^9 KWh and 1KWh = £500

In 2023, AI consumes **3TWh** in average meaning £1.5T = \$375M

Huge Investment is required.



“You’ve trained a \$100M model now and it’s about as good as a **good college freshman.**”

“You train a \$1B model and it’s as good as an **advanced undergrad.**”

“You train a \$10B model and it’s as good as a **top graduate student.**”

“And then when you get your \$100B model, it’s as good as a **Nobel Prize winner.**”

– **Dario Amodei, CEO, Anthropic**



Technological Singularity



Geoffrey Hinton
a.k.a. the “Godfather of AI”

"I think we're moving into a period when, for the first time ever, we may have things more intelligent than us,"

"One of the ways in which these systems might escape control is by writing their own computer code to modify themselves,"

Source: The risks and promise of artificial intelligence, according to the "Godfather of AI" Geoffrey Hinton, CBS News

Technological Singularity



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Source: The risks and promise of artificial intelligence, according to the "Godfather of AI" Geoffrey Hinton, CBS News

Level of intelligence



AI to Hero (AGI)

“Our mission is to ensure that **Artificial General Intelligence** benefits all of humanity.”

—  **OpenAI**

AI to Hero (AGI)

“Our mission is to empower every person and every organization on the planet to achieve more... I think we have the best partnership in tech. I’m excited for us to build **AGI** together”

— **Satya Nadella, CEO, MS**



AI to Hero (AGI)

“In the coming years, AI – and ultimately **artificial general intelligence (AGI)** – has the potential to drive one of the greatest transformation in the history.”

– **Google** DeepMind

AI to Hero (AGI)

“We’ve come to this view that, in order to build the products that we want to build, we need to build for **general intelligence.**”

— **Mark Zuckerberg, CEO, Meta**



AI to Hero (AGI)

“The overarching goal of xAI is to build a good **AGI** with the overarching purpose of just trying to understand the universe.”

— **Elon Musk, CEO, xAI**





AI FARM ROBOTICS

AI to Hero (AGI)



FIGURE 01 + OPENAI
SPEECH-TO-SPEECH REASONING



AI FARM ROBOTICS

AI to Hero (AGI)





AI FARM ROBOTICS



AI to Hero (AGI)





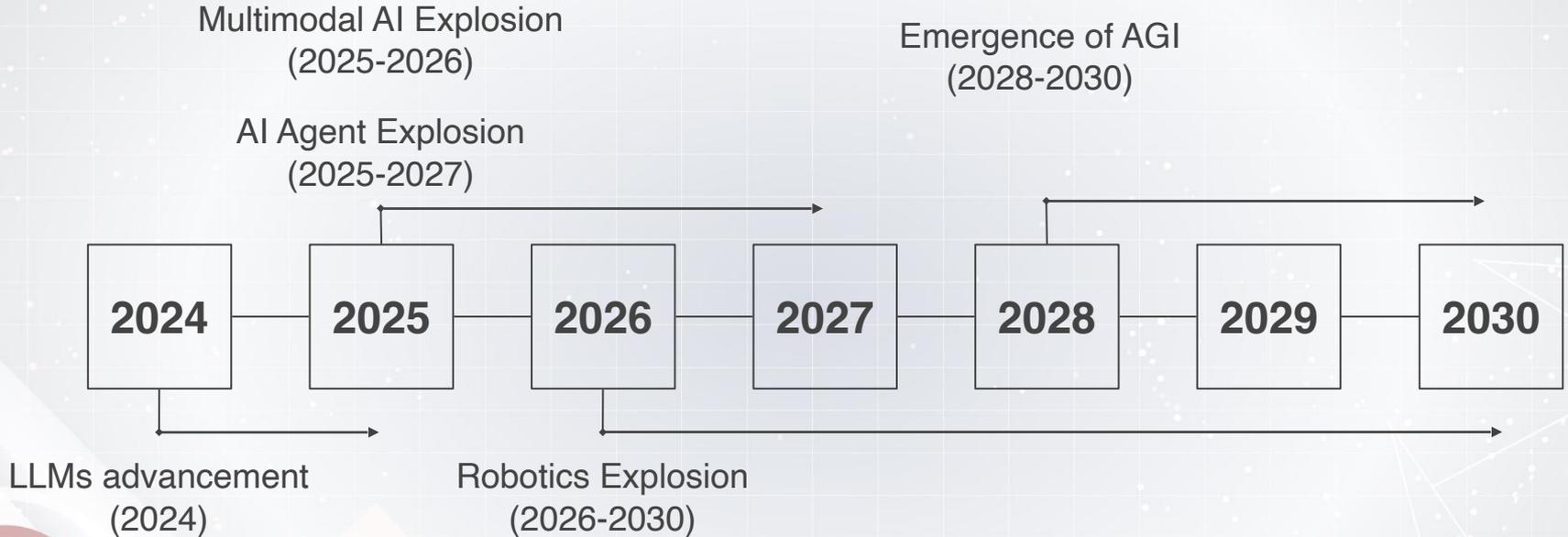
AI to Hero (AGI)





AI FARM ROBOTICS

AI to Hero (AGI)



Source: The Road to AGI, MAICON 2024

Conclusion

AI is experiencing **explosive growth** over these two decades.

Although **AGI** offers the potential to **address challenges beyond human capabilities**, the prospect of **human subordination to AGI** raises **major concerns for the human race**.





AI FARM ROBOTICS

Final Thoughts

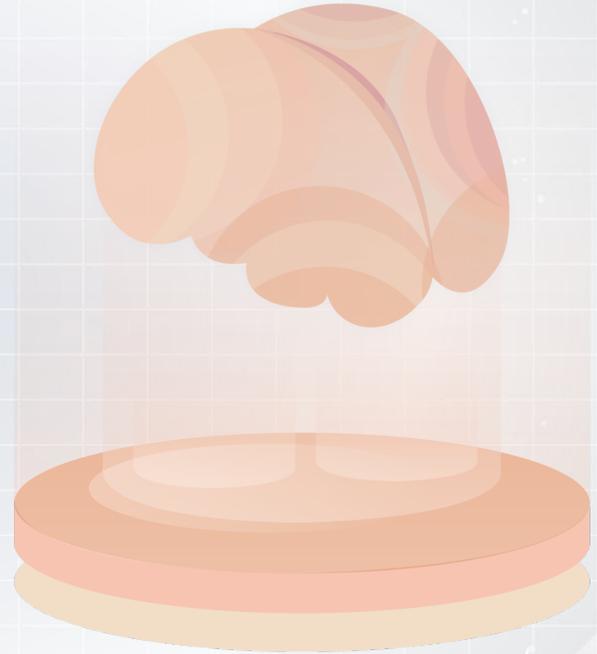


We have the opportunity to **redefine what's possible** and to **lead**.

Be the best at what you're doing.

Be ready to master AI to come.

The goal of AI should be to **unlock human potential**, not to replace it.



Let's write history together!



Source: **AUTOBOTx lab**



“Living code creator – robot makes robot”

THANKS!

Do you have any questions?

www.aifarm.dev



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