

Lecture 2: History of AI

Artificial Intelligence

CS-GY-6613-I

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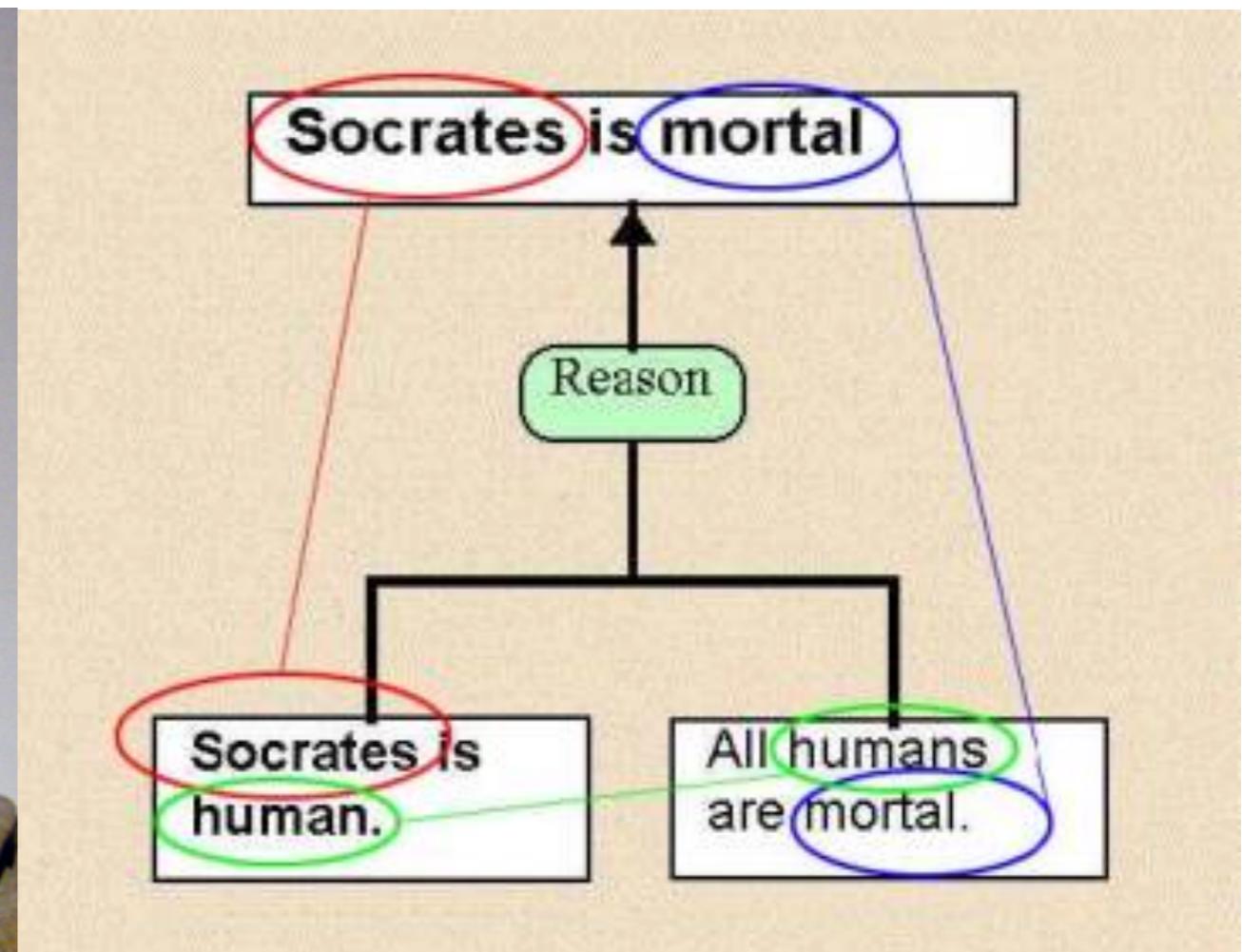
Where did AI come from?

Questions from philosophy

- Can formal rules be used to draw valid conclusions?
- How does the mind arise from the physical brain?
- Where does knowledge come from?
- How does knowledge lead to action?

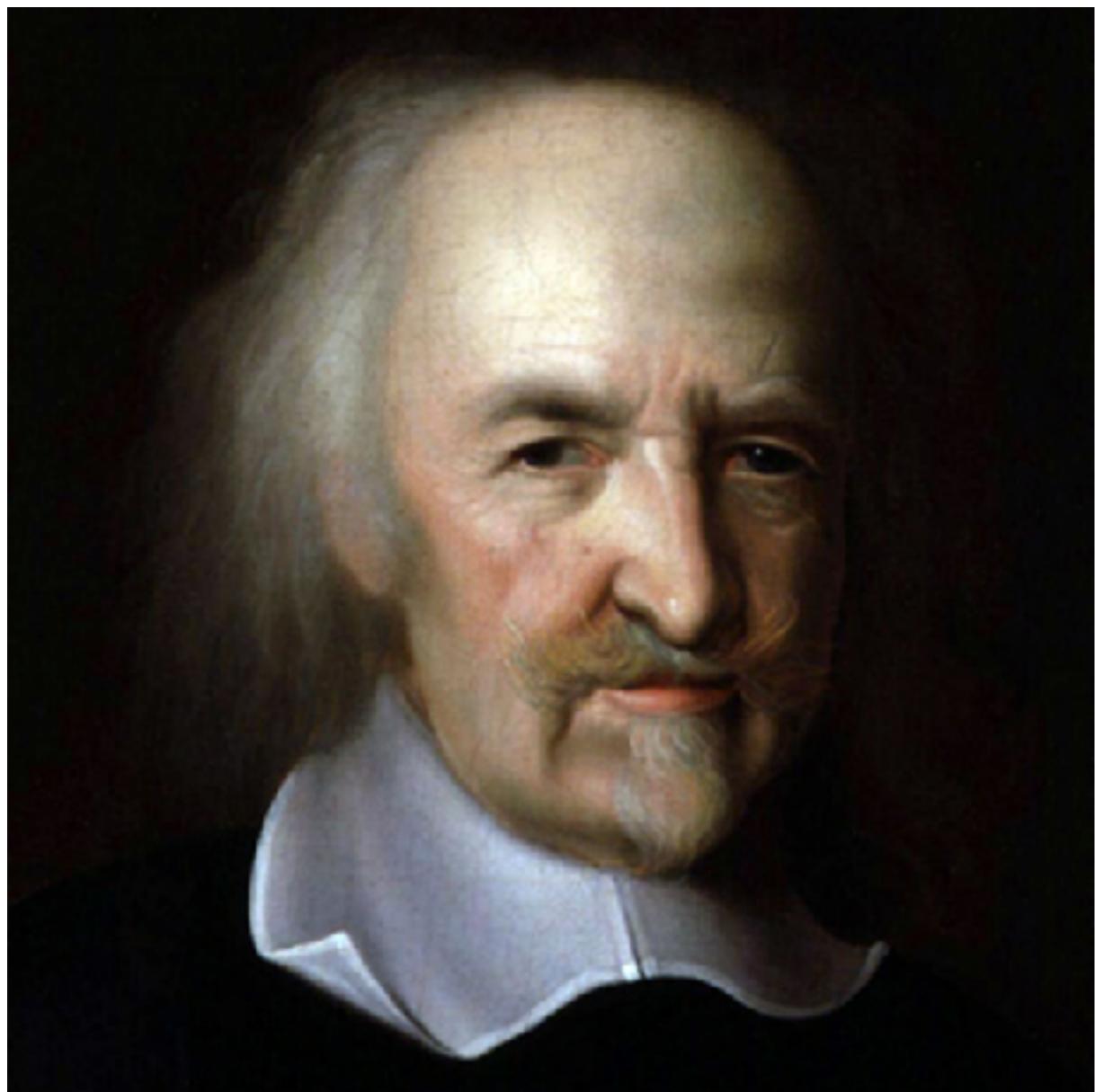
How can we reason?

Aristotle: syllogisms



4th century BC

Hobbes: mechanical reason



- Reasoning like “mental addition and subtraction”
- Artificial animal: “For what is the heart but a spring; and the nerves, but so many strings; and the joints, but so many wheels.”

17th century

Leibniz: universal language



- “when there are disputes among persons, we can simply say: Let us calculate, without further ado, to see who is right”

17th century BC

How do we get knowledge?

Plato: rationalism



- Deduce from innate knowledge

Aristotle: Empiricism



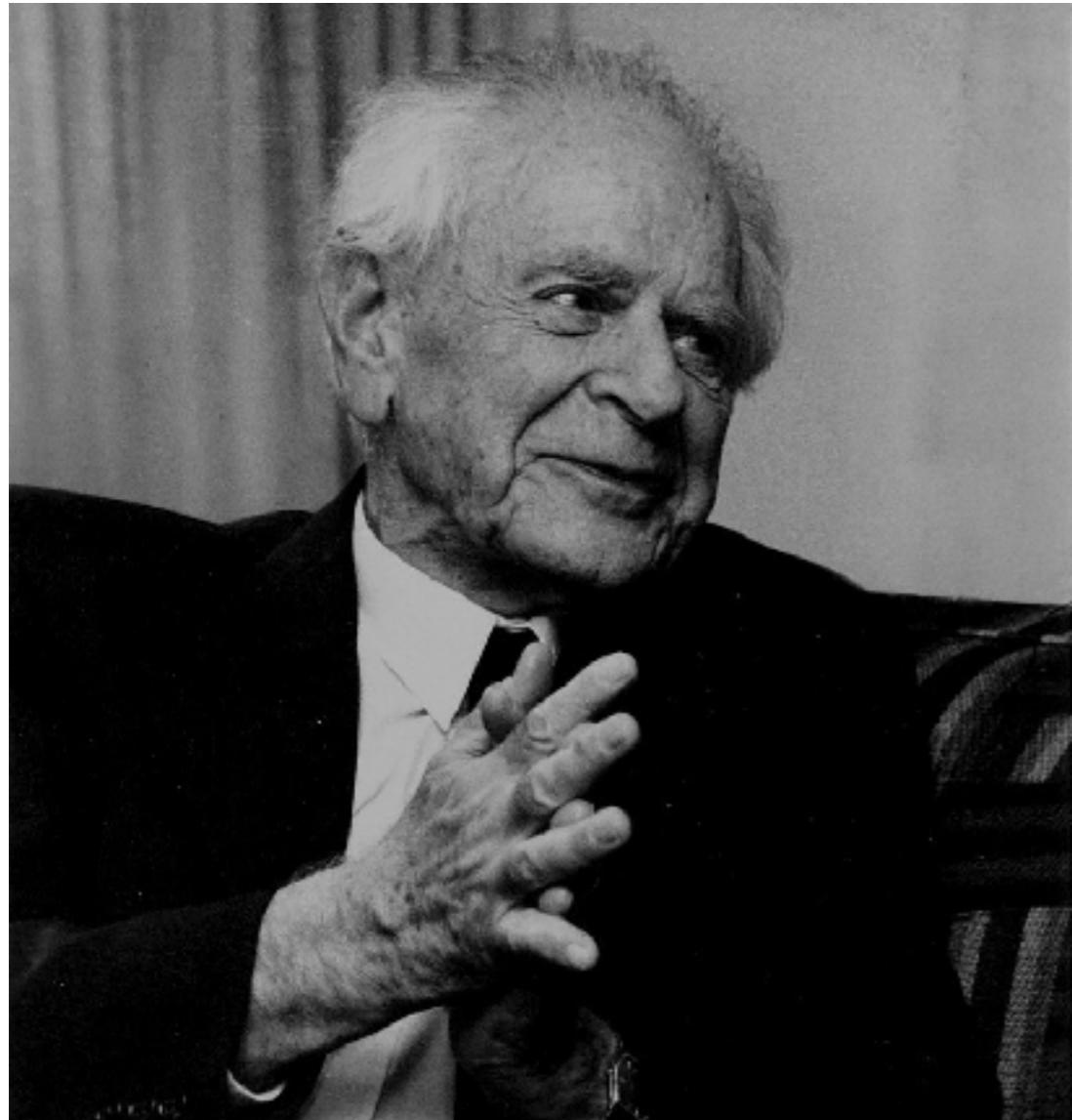
- Learn from our senses

Hume: induction



- We generalize from multiple observations

Popper: critical rationalism



- We advance hypotheses, and try to falsify them based on our sense experiences

Other fields

- Psychology: how do we think?
- Neuroscience: what is that thinking based on?
- Economics: what is rational action?
- Engineering: what can we implement AI in?

The birth of AI: 1956

ANNALS

A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence

August 31, 1955

John McCarthy,
Marvin L. Minsky,
Nathaniel Rochester,
and Claude E. Shannon

The 1956 Dartmouth summer research project on artificial intelligence was initiated by this August 31, 1955 proposal, authored by John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon. The original typescript consisted of 17 pages plus 11 pages of figures of the types of data based on the activities at Dartmouth College and Stanford University. The first 8 pages state the proposal, and the remaining pages give publications and biographies of the four who proposed the study. In the interest of brevity, this article reproduces only the proposal itself, along with the short bibliographical statements of the proposers.

We propose that a 2 month, 10 man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. 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. An attempt will be made to find how to make machines use lan-

guage, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer.

The following are *some* aspects of the artificial intelligence problem:

1. Automatic Computers

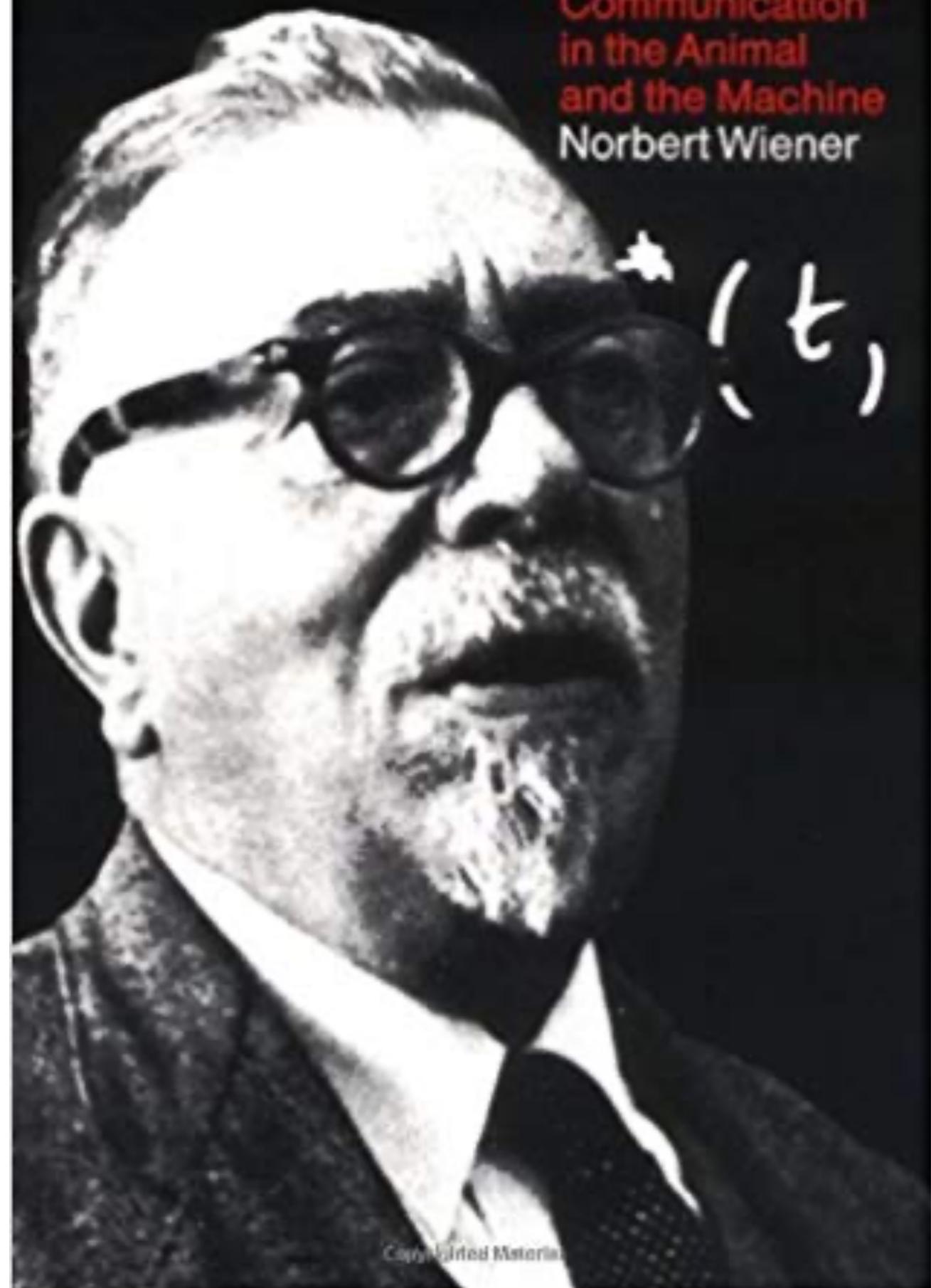
If a machine can do a job, then an automatic computer can be programmed to simulate the machine. The specified memory capacities of present computers may be insufficient to simulate many of the higher functions of the human brain, but the major obstacle is not lack of machine capacity, but our inability to write programs taking full advantage of what we have.

2. How Can a Computer be Programmed to Use a Language

It may be speculated that a large part of human thought consists of manipulating words according to rules of reasoning and rules of grammar. From this point of view, forming a generalization consists of admiring a new

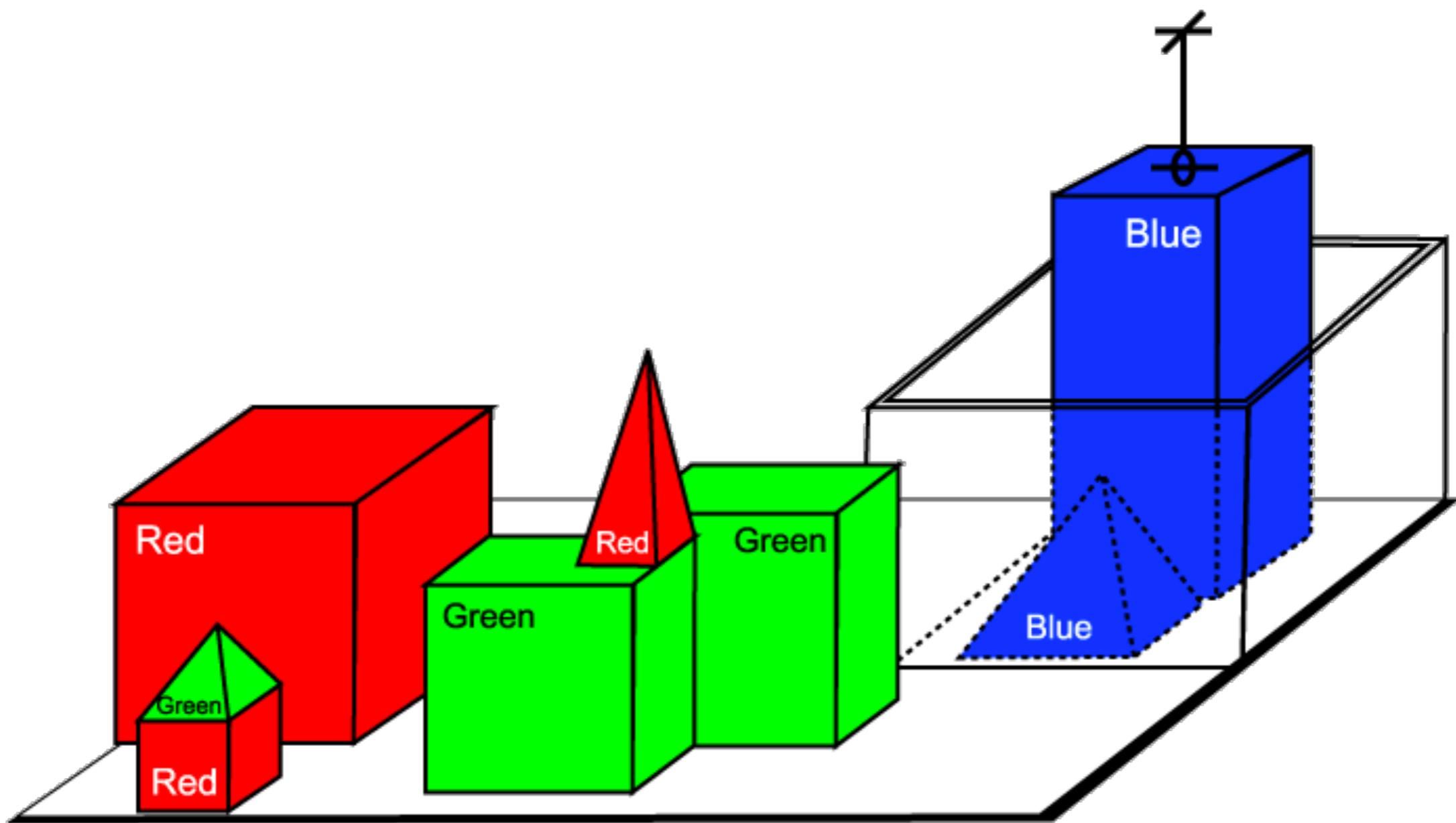
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Cybernetics:
or Control and
Communication
in the Animal
and the Machine
Norbert Wiener

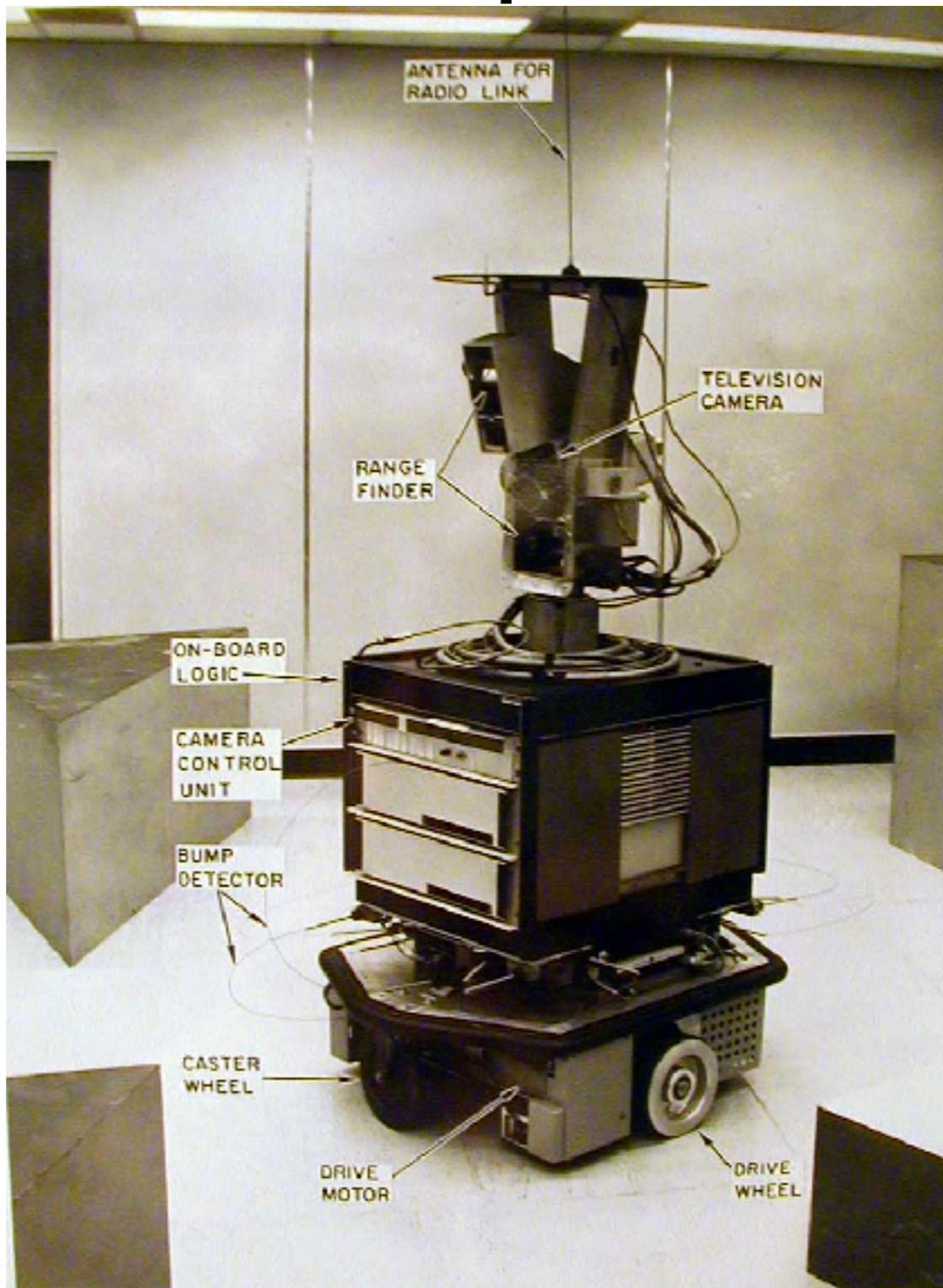


The other
birth of AI

Great expectations

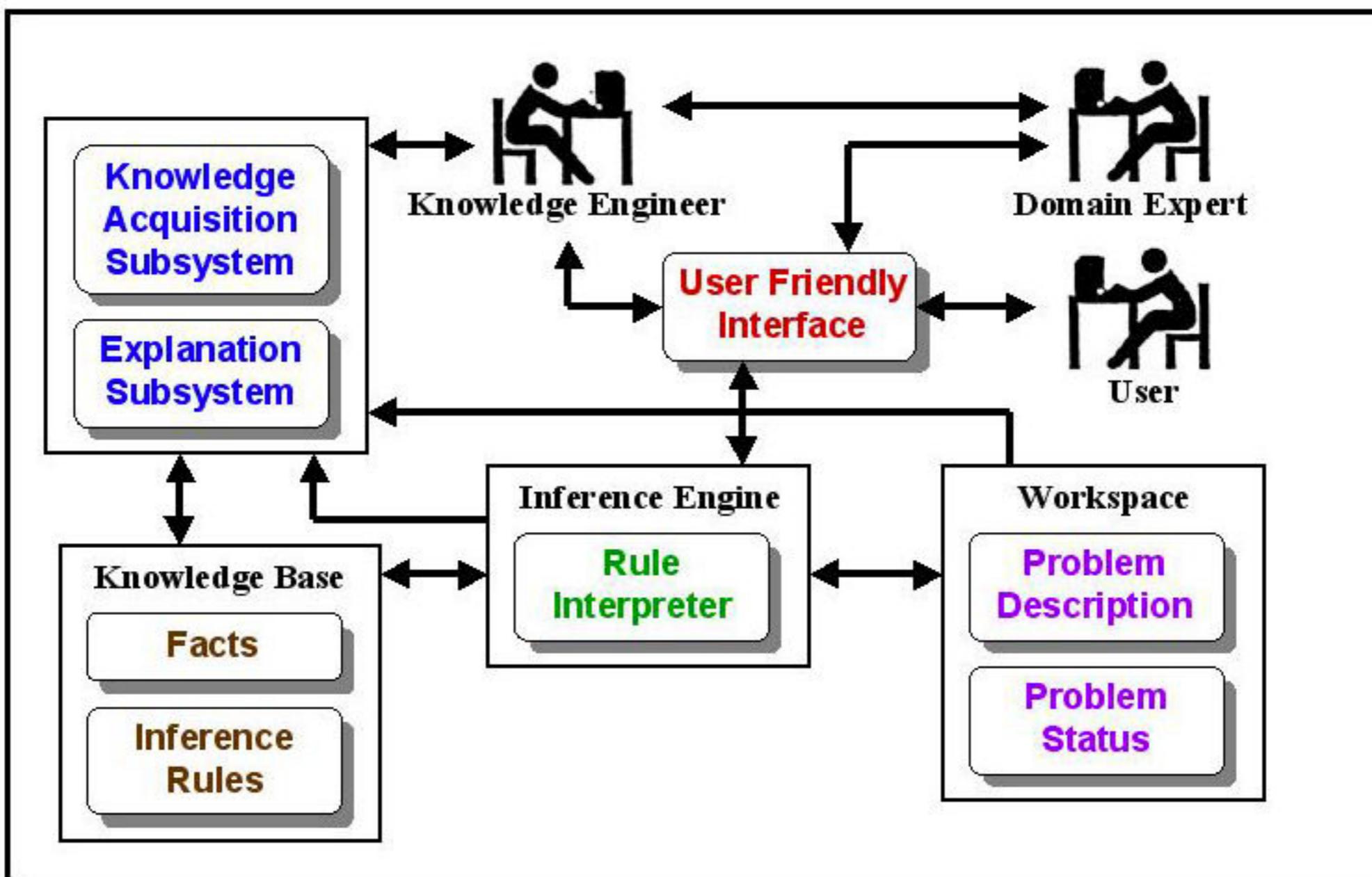


Greater expectations

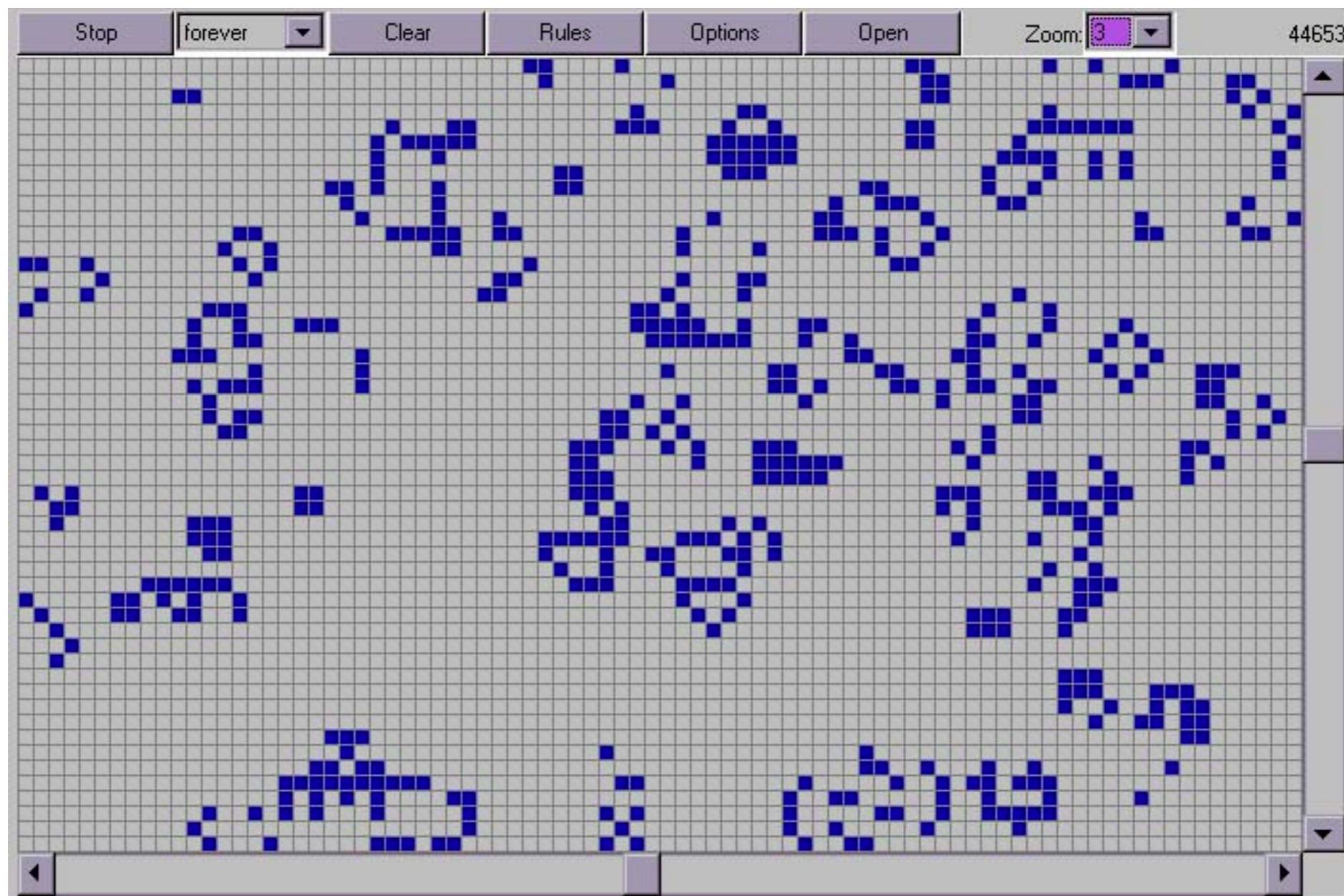


AI Winter

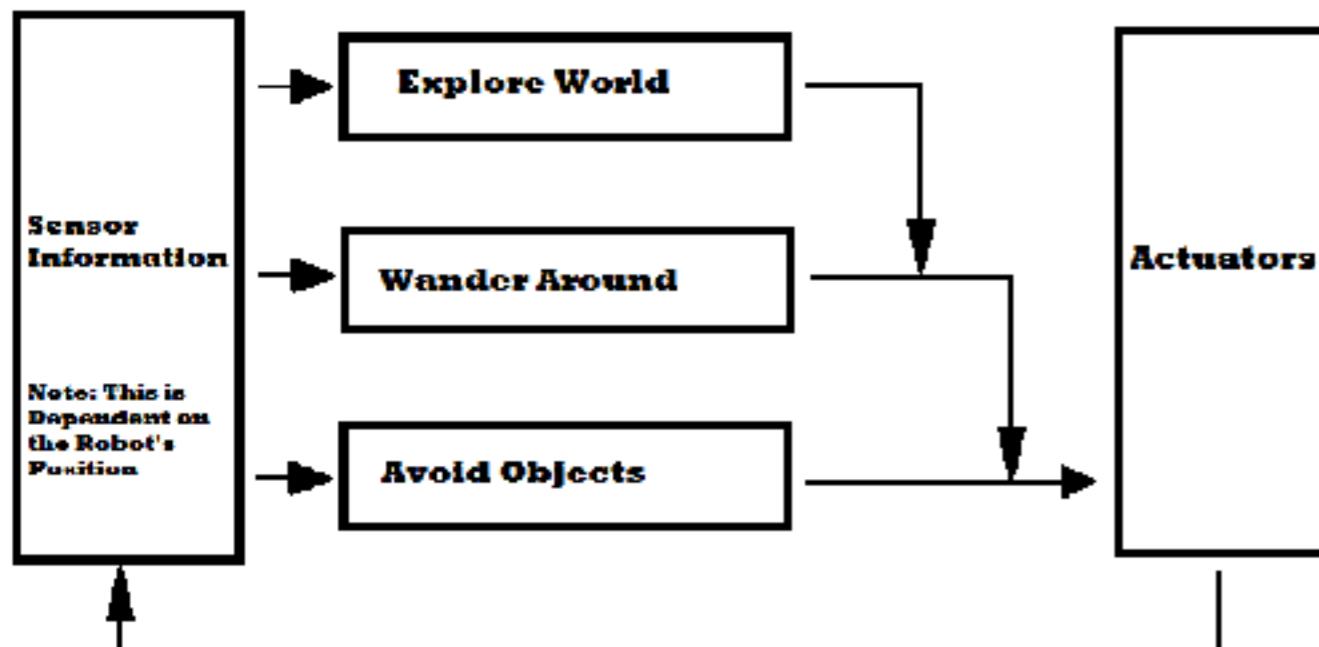
Expert systems



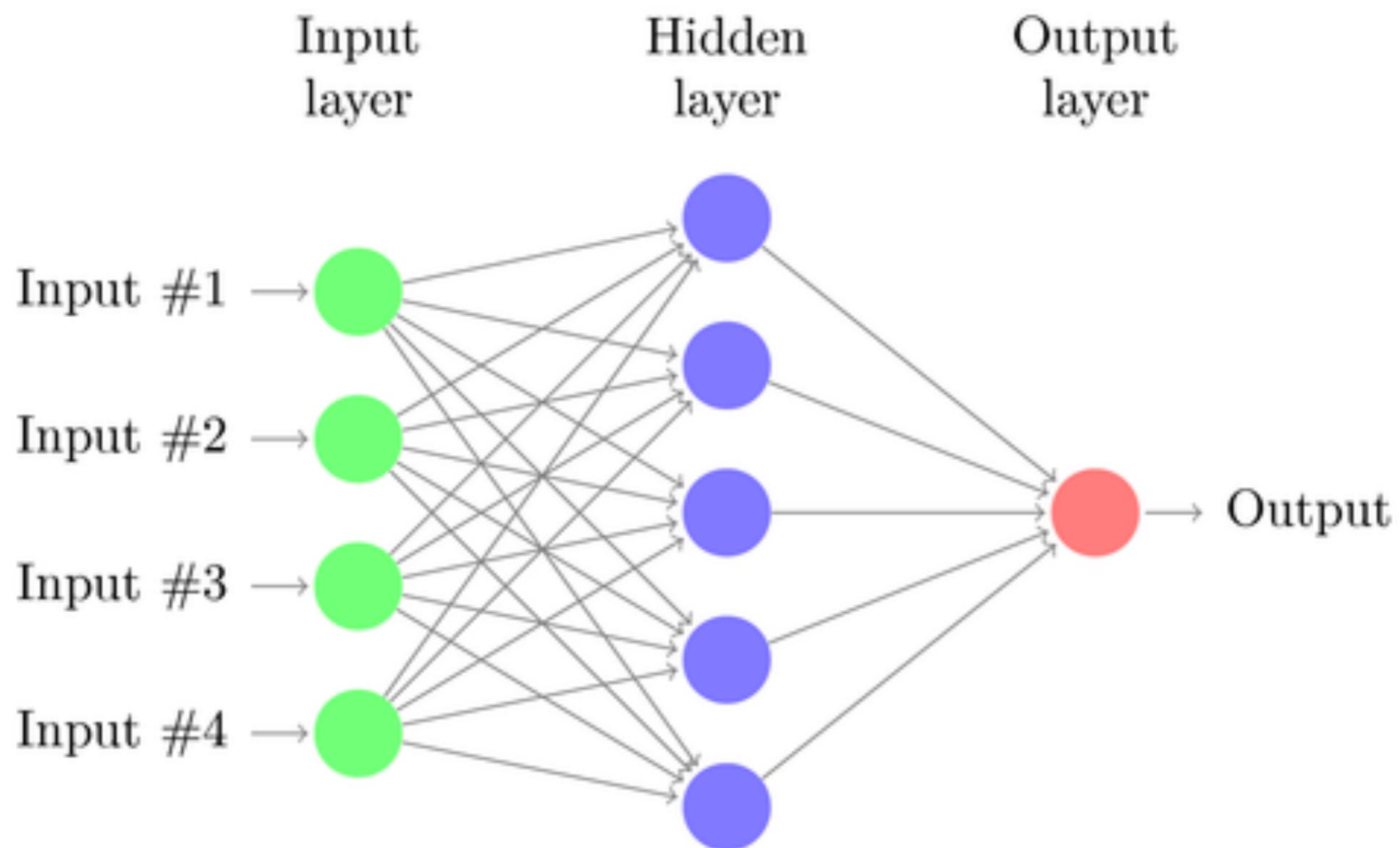
Biological inspiration



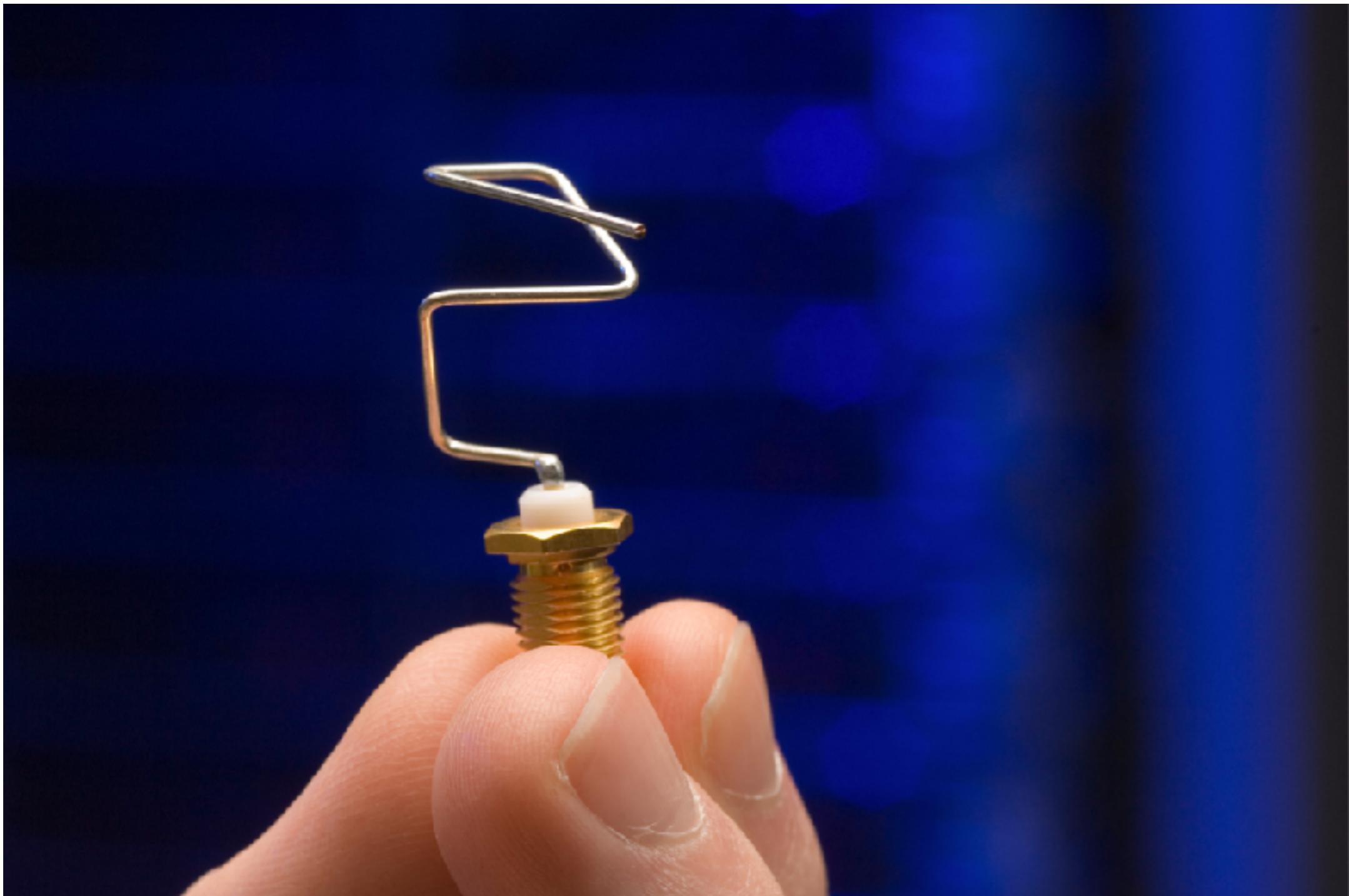
New AI, new robotics



Neural networks



Evolutionary computation

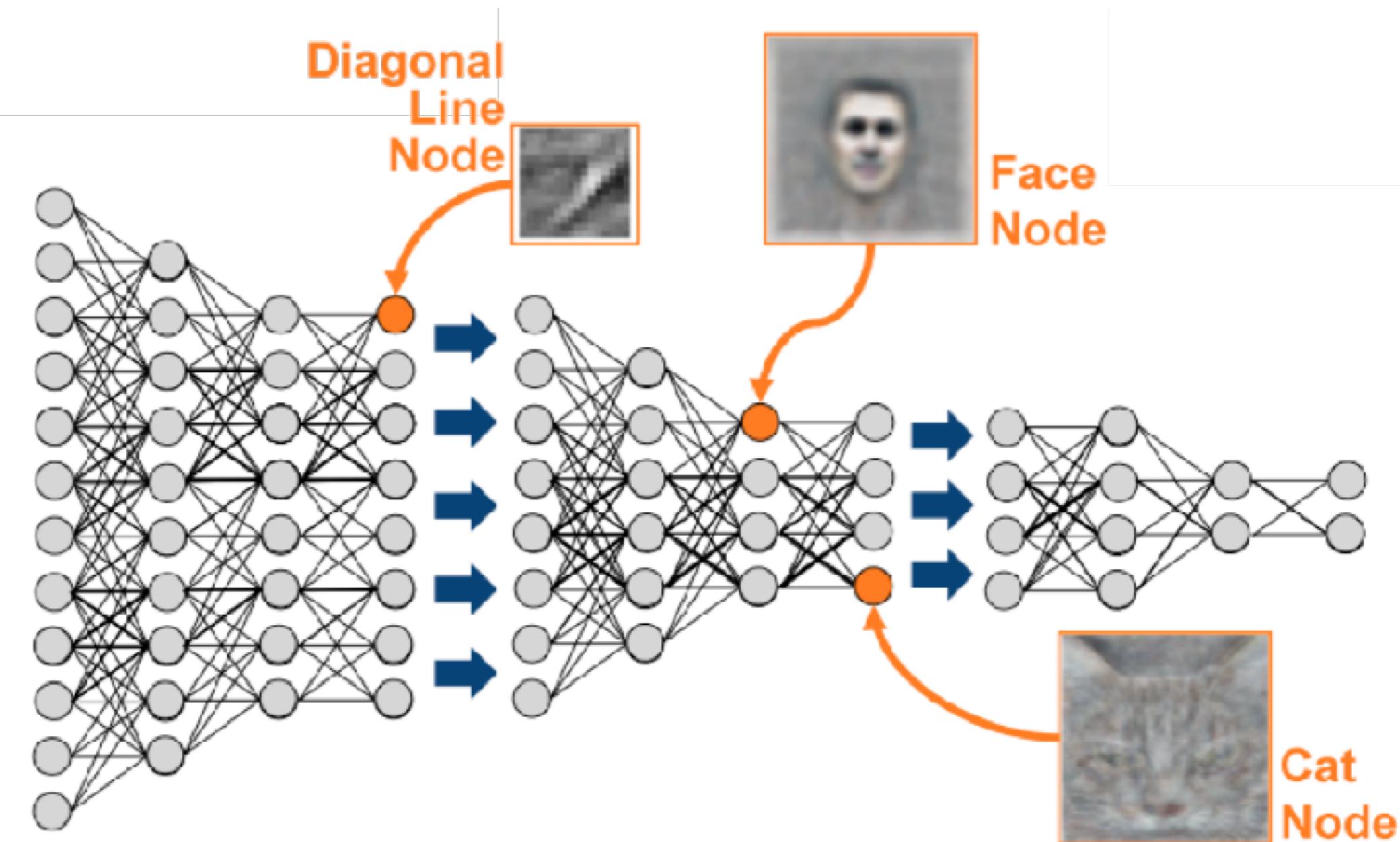


Some current applications
and hot topics in AI

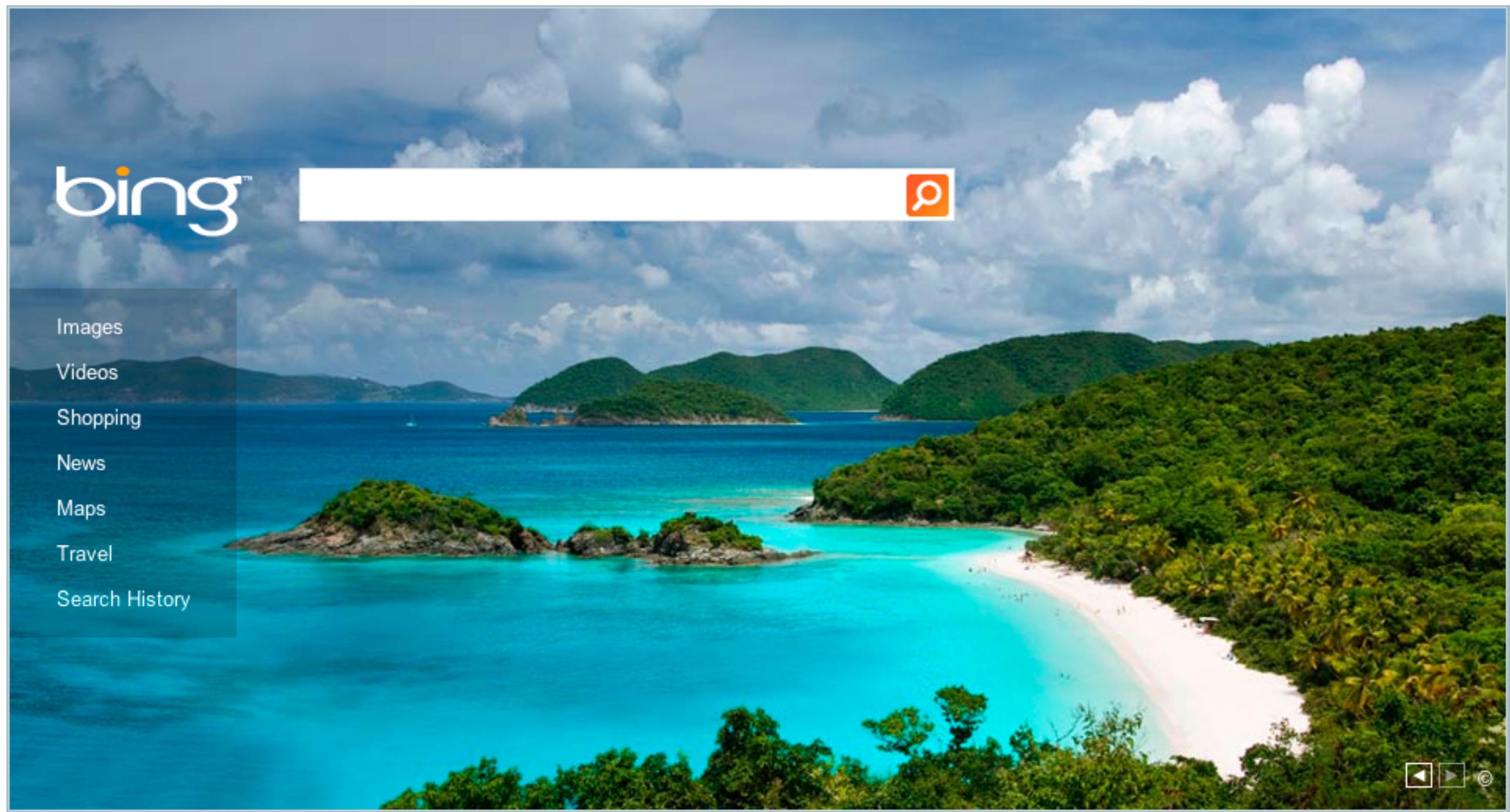
Data mining



Deep learning



Search engines



Machine translation

The screenshot shows the Google Translate interface. At the top, there's a navigation bar with the Google logo, user profile (Julian), and social sharing options (G+). Below the bar, the word "Translate" is displayed in red. The main area shows two language pairs: English to English (detected) and English to Swedish. The English input field contains the phrase "machine translation". The Swedish output field shows the translation "maskinöversättning". Both fields have small icons for audio playback and a "Wrong?" button. Below the input field, there's a section titled "Definitions of machine translation" with a "noun" definition: "translation carried out by a computer." A quote follows: "'When you put speech recognition together with machine translation , you get terrible results.'" Under the "See also" heading, "machine, translation" is listed. A downward arrow icon is at the bottom.

Google Julian G+

Translate

English Armenian Italian English - detected

English Swedish Italian

Translate

machine translation

x

maskinöversättning

Wrong?

Definitions of machine translation

noun

translation carried out by a computer.

"When you put speech recognition together with machine translation , you get terrible results."

See also

machine, translation

Playground ⓘ



Load a preset...



Julian Togelius entered the classroom for the first time in more than six months. The room normally had space for 300 eager students, but now there were just a handful of them. He had taught his class on artificial intelligence many times before, but this year everything was going to be different because of the pandemic.

As he walked towards the front of the room, Togelius looked at the empty desks. It was a sad sight. There were so few young people left, and it was a constant reminder of the desperate situation.

'Good morning, everyone. How did you spend your winter break?'

He immediately regretted his words. It sounded like a school teacher's opening line. It sounded forced and unnatural.

'I don't know about you, but I spent the break working on some ideas for artificial intelligence. That's what we'll be doing in this course, so let's get started.'

He could see that the students were more eager than usual, but then again, they had little else to do.

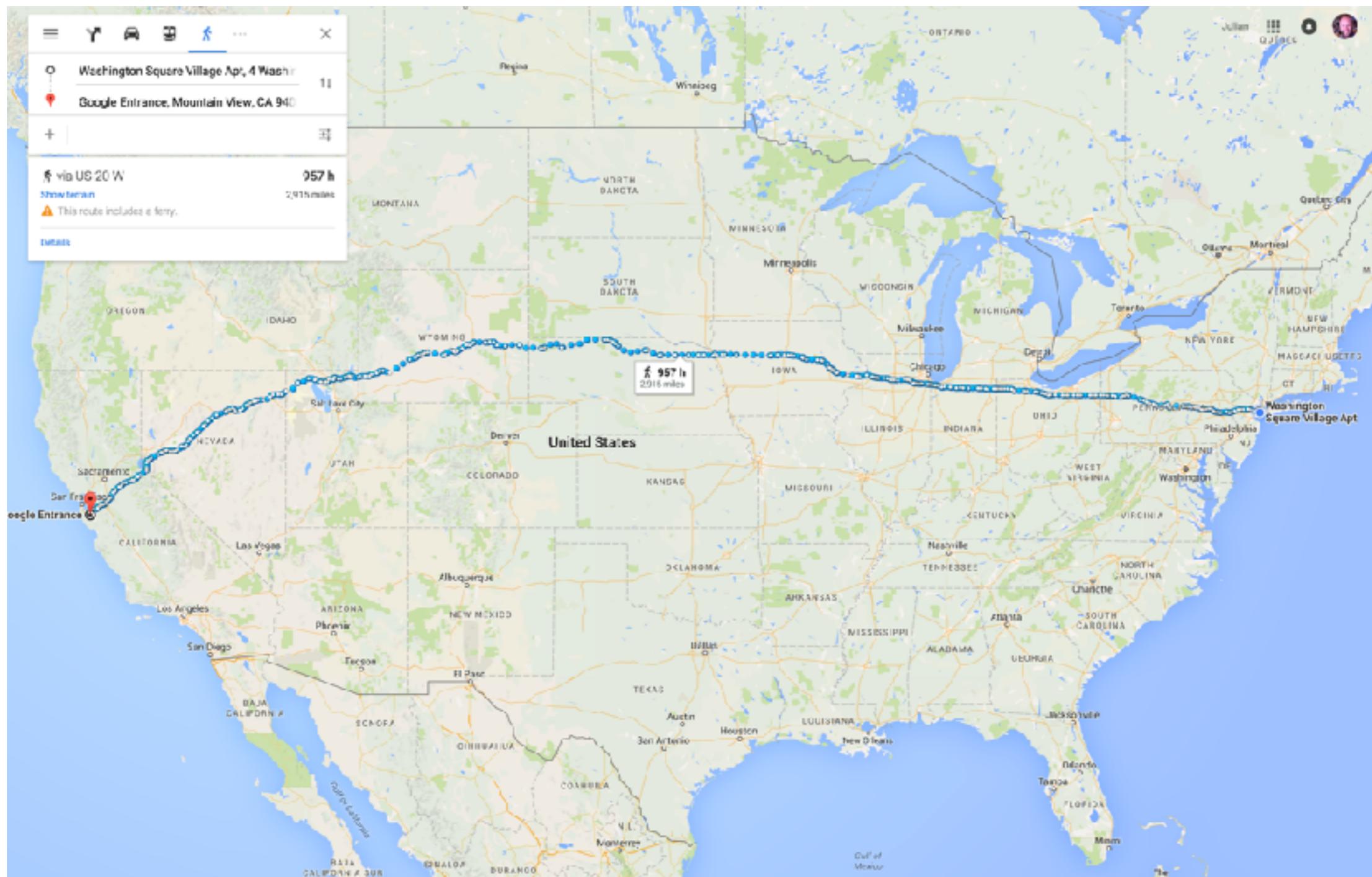
'So what is artificial intelligence?'

Togelius had started his lecture with that question many times in the past and was never quite sure how to answer it. He had learned from experience that it was best not to try to define artificial intelligence.

'I'm going to show you a video to help you understand the question. I think you'll find it very interesting,' he said.

Togelius picked up his iPad and clicked on the video. At least that part was easy. The video was

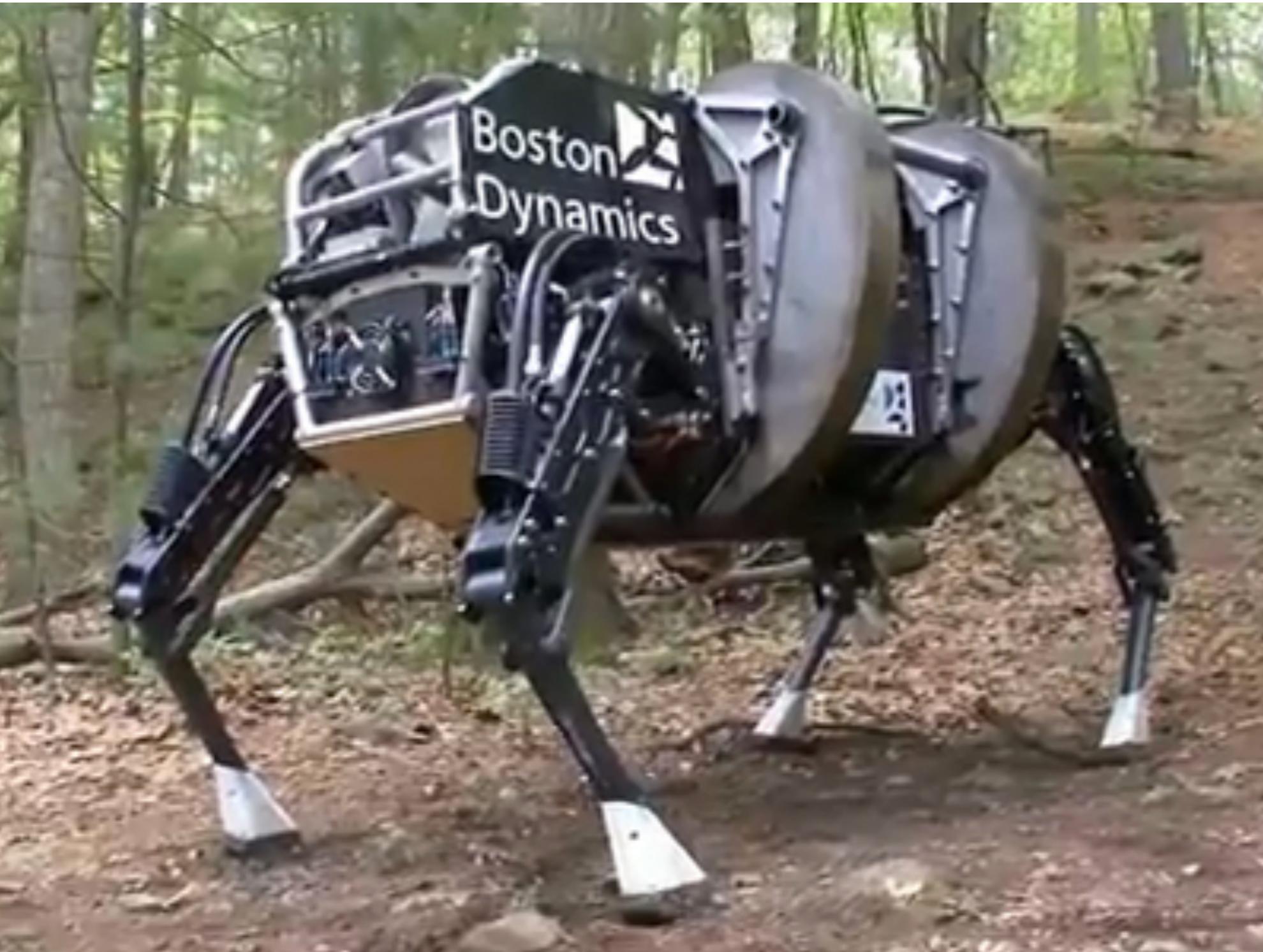
Routing



Self-driving cars



Walking robots



Military robots



Games



Games



Superintelligence?

