

Agents and Definitions of Artificial Intelligence

Intelligence is the art of good guesswork.
(H. B. Barlow)

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Definitions of AI

What is Artificial Intelligence?

- Artificial Intelligence is *the synthesis and analysis of computational agents that act intelligently*.
- An *agent* is something that *acts* in an environment.
- An agent acts *intelligently* to the extent that it uses its perceptions, knowledge and experience to maximize its expected performance.
 - Its actions are appropriate.
 - It is flexible to change.
 - It learns from experience.
 - It works within its limitations.

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The Turing Test

- This idea of defining intelligence by external behavior was the motivation for the *Turing test*.
- The Turing test consists of an imitation game where an interrogator can ask a witness, via a text interface, any question.
- If the interrogator cannot distinguish the witness from a human, the witness must be intelligent.
- An agent could not fake intelligence for arbitrary topics.

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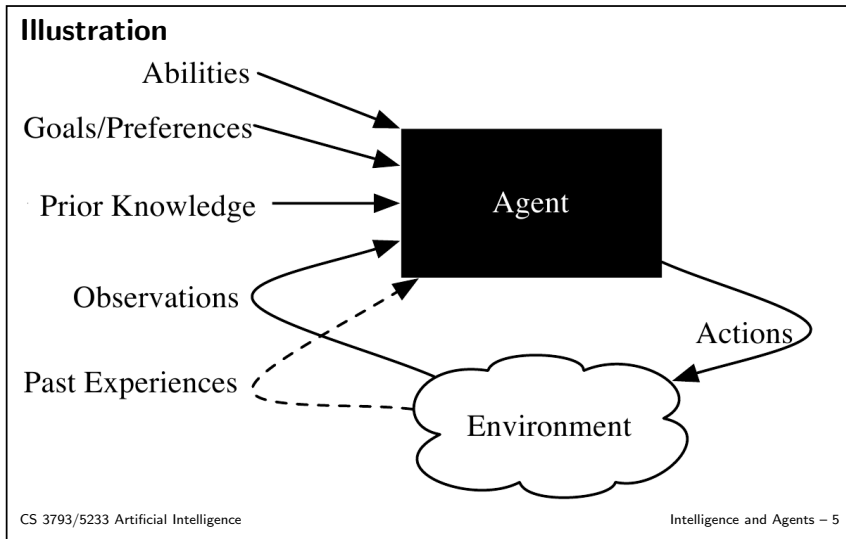
Goals of Artificial Intelligence

- **Scientific goal:** to understand the principles that make intelligent behavior possible in natural or artificial systems.
 - analyze natural and artificial agents
 - formulate and test hypotheses about what it takes to construct intelligent agents
 - design, build, and experiment with computational systems that perform tasks that require intelligence
- **Engineering goal:** design useful, intelligent artifacts.

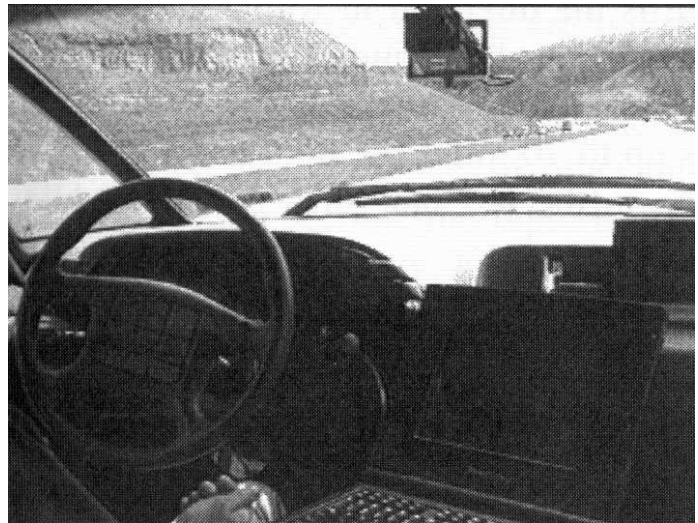
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Agents

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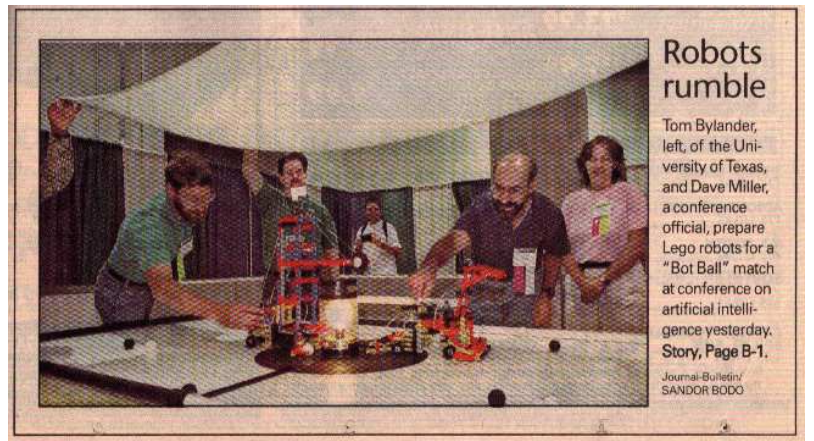


Example 1



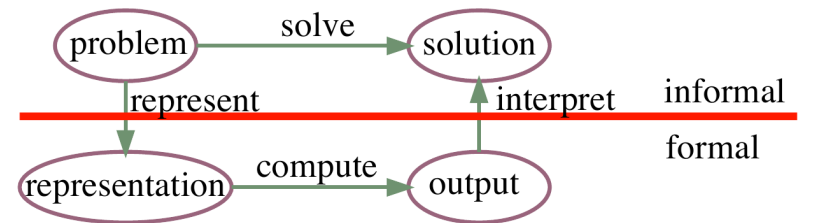
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Example 2



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Knowledge Representation



To solve a problem, the designer of a system must

- understand the problem and its solution
- represent the problem in a computer language
- use the computer to compute an output
- interpret the output as a solution

AI focuses on KRs that generalize for many problems.

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Probability

- Agents need to act even if they are uncertain.
- Predictions are needed to decide what to do.
- Acting is gambling: agents who don't use probabilities will do worse than those who do.
- Probabilities can be obtained from prior knowledge or learned from data.