

Computational Intelligence

A Logical Approach

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Oxford University Press

1998



What is Computational Intelligence?

The study of the design of **intelligent agents** .

An **agent** is something that acts in an environment.

An **intelligent agent** is an agent that acts intelligently:

- its actions are appropriate for its goals and circumstances
- it is flexible to changing environments and goals
- it learns from experience
- it makes appropriate choices given perceptual limitations and finite computation

Artificial or Computational Intelligence?

- The field is often called **Artificial Intelligence**.
- **Scientific goal:** to understand the principles that make intelligent behavior possible, in natural or artificial systems.
- **Engineering goal:** to specify methods for the design of useful, intelligent artifacts.
- Analogy between studying flying machines and thinking machines.

Central hypotheses of CI

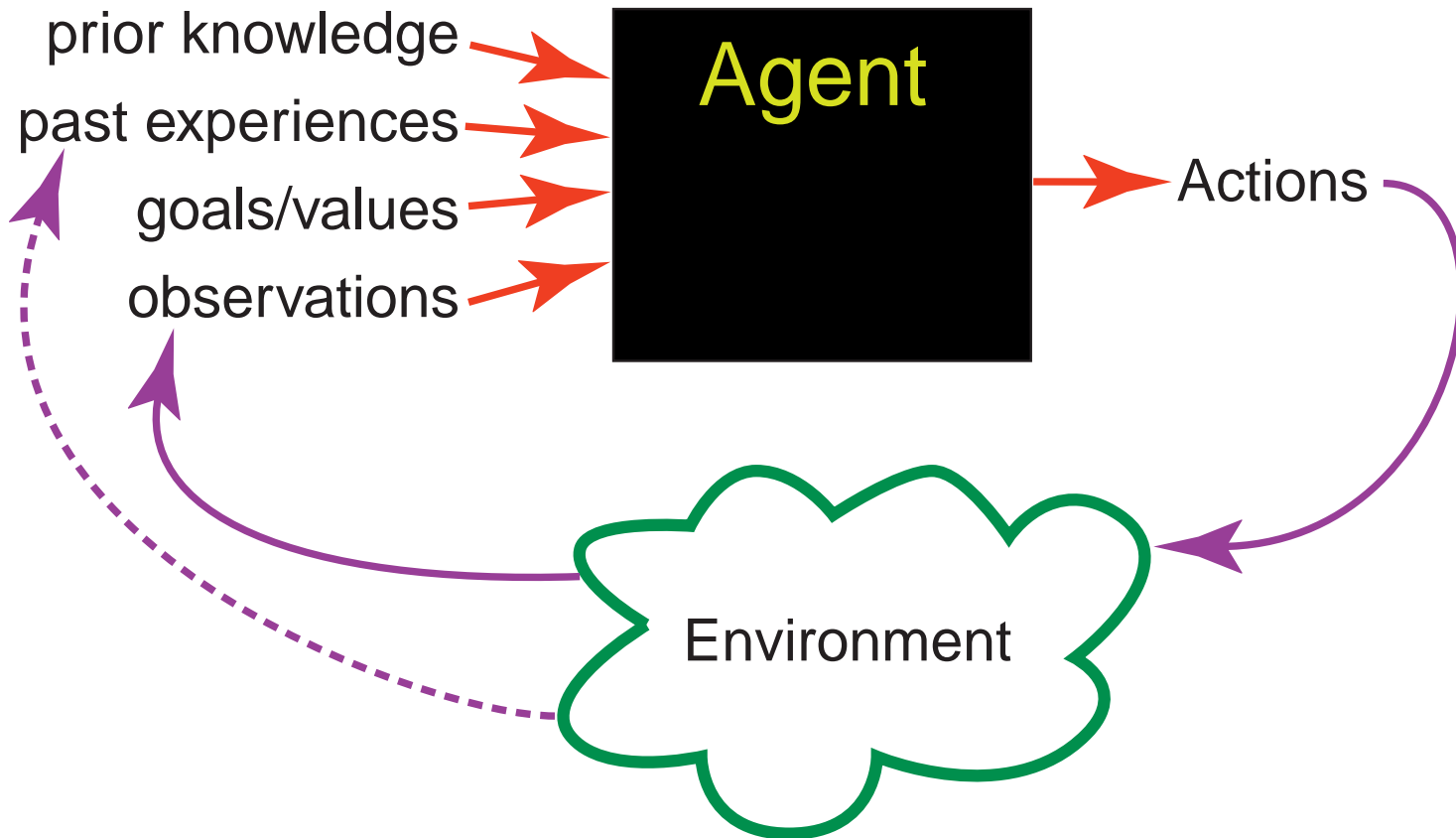
Symbol-system hypothesis:

- Reasoning is symbol manipulation.

Church–Turing thesis:

- Any symbol manipulation can be carried out on a Turing machine.

Agents in the World



Representation and Reasoning

To use these inputs an agent needs a representation of them.

⇒ knowledge

Most common sense tasks rely on a lot of knowledge.

Representation and Reasoning System

Problem \implies representation \implies computation

A representation and reasoning system (RRS) consists of

- Language to communicate with the computer.
- A way to assign meaning to the symbols.
- Procedures to compute answers or solve problems.

Example RRSs:

- Programming languages: Fortran, C++,...
- Natural Language

We want something between these extremes.

