Definitions of AI

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Lecture 1

Readings: RN 1.1.

Outline

Learning Goals

Definitions of Artificial Intelligence
  Cognitive Modeling
  Turing Test
  Laws of Thought
  Rational Agent

Which Definition Would You Adopt?

Revisiting the Learning Goals

Learning goals

By the end of the lecture, you should be able to

- Describe each of the four definitions of AI.
- Compare and contrast the four definitions of AI.
- Give a few reasons why we chose the Rational Agent definition rather than the other three definitions.

Outline

What is Artificial Intelligence?

| Systems that think like humans	Systems that think rationally
Systems that act like humans	Systems that act rationally

Thinking Humanly

The Cognitive Modeling Approach

- ▶ Why humans?
  Humans are one of a few examples of intelligence.

- ▶ How do humans think?
  - ▶ Introspection
  - ▶ Psychological experiments
  - ▶ Brain imaging (MRI)

- ▶ Cognitive Science: The goal is to construct precise and testable theories of the human mind.

Acting Humanly

The Turing Test Approach
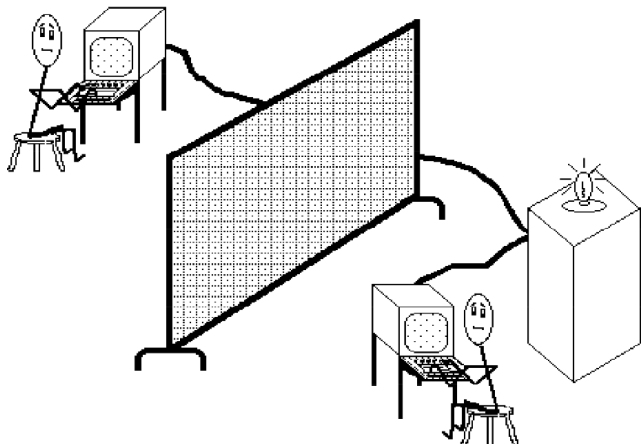
The Turing Test

- An operational definition

- Is the Turing Test useful?

Rationality

- Rationality: an abstract "ideal" of intelligence, rather than "whatever humans do"

- A system is rational if it does the "right thing," given what it knows.

Thinking Rationally

The Laws of Thought Approach

- Greek philosopher Aristotle defined syllogisms.

- The logicist tradition

- Two obstacles for using this approach in practice

Acting Rationally

The Rational Agent Approach

- Agent means todo.

- A rational agent acts to achieve the best (expected) outcome.

- What behaviour is rational?

Four Definitions of Artificial Intelligence

Cognitive Modeling	Laws of Thought
Systems that think like humans	Systems that think rationally
Turing Test	**Rational Agent**
Systems that act like humans	Systems that act rationally

Outline

CQ: Which definition of intelligence would you adopt?

CQ: If you were an Artificial Intelligence researcher,
which of the following definitions of intelligence would you adopt?

(A) Systems that think like humans

(B) Systems that act like humans

(C) Systems that think rationally

(D) Systems that act rationally

Modeling Behaviour rather than Thoughts

Why do we aim to model behaviour instead of thoughts?

Modeling Behaviour rather than Thoughts

Why do we aim to model behaviour instead of thoughts?

- ▶ Acting rationally is more general than thinking rationally.
  Correct thinking is only one way to achieve rationality.
- ▶ When there is no logically correct thing to do,
  we still need to take an action.
- ▶ Sometimes, we do the right thing without thinking.
  Some actions are just reflexes.

Use Rationality rather than Humans as the Benchmark

Why do we measure success against rationality
instead of against humans?

Use Rationality rather than Humans as the Benchmark

Why do we measure success against rationality
instead of against humans?

- Humans often act in ways that we don't consider intelligent.

- Rationality is mathematically well-defined and completely
  general. It's easy to study it scientifically.

- Analogy between the development of flying machines and
  intelligent machines.
  To understand flying:
  (1) assume structures common to flying animals are
  fundamental for flying.
  (2) understand the principles of flying — aerodynamics

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