Intro to AI

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What is AI?

- "The practice of designing systems that possess and acquire knowledge and reason with knowledge." (Tanimoto 1987)

- "The design and study of computer programs that behave intelligently." (Dean, Allen, Aloimonos 1995)

- "The branch of computer science concerned with making computers behave like humans." (Webopedia)

What is AI?

- But then, what is intelligence???
    - "the capacity for learning, reasoning, understanding, and similar forms of mental activity; aptitude in grasping truths, relationships, facts, meanings, etc." (Webster's Encyclopedic Unabridged Dictionary of the English Language 1996)

What is AI?

Categories under AI on Cora (~1999-2001)

Domain Specific Search Engine for CS papers

- Agents
- Data Mining
- Expert Systems
- Games and Search
- Knowledge Representation
- Machine Learning
- Theory, Case-Based, Rule Learning, ...

- Natural Language Processing
- Planning
- Robotics
- Speech
- Theorem Proving
- Vision & Pattern Recognition

What is AI?

- Goals in AI
  - Engineering: Solve real-world problems. Build systems that exhibit intelligent behavior.
  - Scientific: Understand what kind of computational mechanisms and knowledge are needed for modeling intelligent behavior.

What is AI?

- Do we really want to model humans?
  - Seem like our best example, but….
  - Should we build airplanes with wings that flap like birds?
- How do we know we did it?
  - Turing test?
    - Focus on behavior instead of internal algorithm
    - Defines success in terms of human intelligence

The Turing Test

- Test proposed by Alan Turing in 1950

- The computer is asked questions by a human interrogator. It passes the test if the interrogator cannot tell whether the responses come from a person

- Required capabilities: natural language processing, knowledge representation, automated reasoning, learning,...

- No physical interaction

But, does this show intelligence???

The Chinese Room

- Searle (1980) p. 958

- Human: CPU
- Rule Book: Program
- Paper: Memory

- Human understands only English
- Input symbols, output symbols based on rules
- Appears to have conversation in Chinese
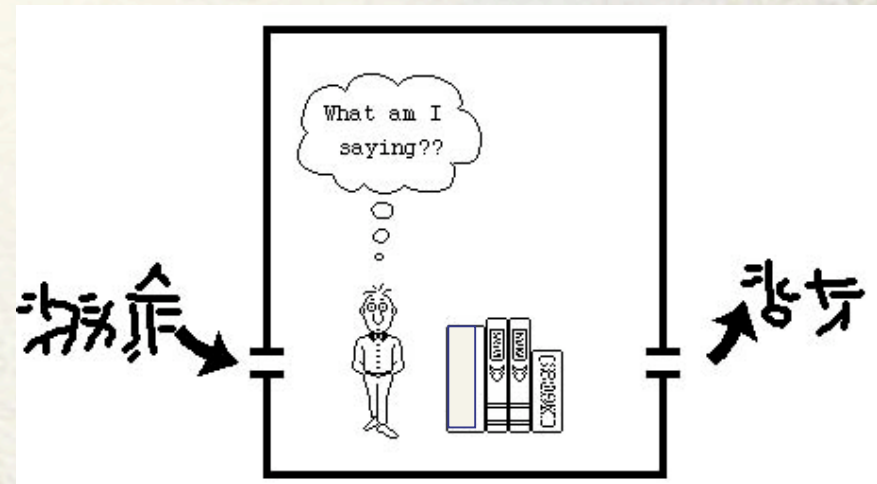
How strong do you like your AI?

- Weak AI
  - Machines could act as if they were intelligent
- Strong AI
  - Machines that act intelligent are actually thinking

What is AI?

- A few recurring issues:
  - How important is cognitive modeling in our systems?
  - How do we balance scientific and engineering goals?
  - How do we evaluate our system?

Bits of History

- 1956: The name "Artificial Intelligence" is coined
- 60's: Search and games, formal logic and theorem proving
- 70's: Robotics, perception, knowledge representation, expert systems
- 80's: More expert systems, AI becomes an industry
- 90's: Rational agents, probabilistic reasoning, machine learning
- 00's: Systems integrating many AI methods, machine learning, reasoning under uncertainty, robotics again

Coming Next

- By Friday
  - Sign up for class mailing list
  - Read Chapter 1 in R&N
- We'll cover Intelligent Agents briefly (Ch. 2)
- Then to Problem Solving (search)
- Some Lisp programming in the next few weeks