

Artificial Intelligence

CS 444 – Spring 2019

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Outline for Today

- Define AI
 - Acting Humanly
 - Thinking Humanly
 - Thinking Rationally
 - Acting Rationally
- Course Objectives
 - Tentative Schedule
 - Required Reading
 - Grading and Contact Information

What makes up AI?

- Do self driving cars?
- How about computers that play chess?
- Walking robots?

Is it Intelligent to be **Human** or to be **Rational**?

Systems that think like humans

Systems that think rationally

Systems that act like humans

Systems that act rationally

Define Intelligence

- Are we intelligent?
- If you can calculate a square root, are you intelligent?

Calculate a Square Root

Find the square root of S .

- Initialize: Set x to a guess
- Repeat:
 - Calculate $x_{\text{next}} = \frac{1}{2} \left(x + \frac{S}{x} \right)$
 - $x = x_{\text{next}}$

My Definition of AI

Using an non-human mechanism to either to:

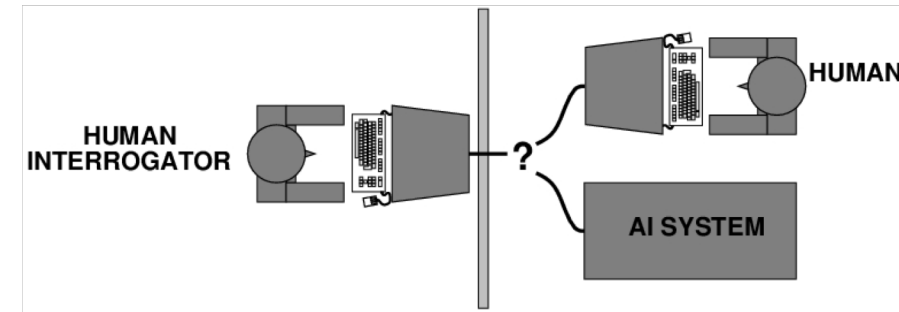
- solve a problem that does not have an efficient algorithm and requires "intuition"
- Reasons using facts (and allows new facts to be learned)
- Learns a process by given a set of examples (this is a specialty of AI known as machine learning or statistical inference).

The Turing Test for an Intelligent Artifact

- To be intelligent is to act humanly.

Turing Test

- Turing focused on “acting like a human” as an operational definition of artificial intelligence: Turing (1950).
“Computing machinery and intelligence”
- Proposed the “imitation” game as a test for a hidden intelligent artifact who could be fed visual and material information
- **Objective:** fool a human 30% of the time in a 5-minute test



This test introduced major components of AI: knowledge, reasoning, language, understanding, learning (computer vision, robotics). Turing predicted this would be reached by the year 2000.

Issues with the Turing Test

Problem: Turing test is not reproducible, informative/constructive, or amenable to mathematic analysis.

Weak vs Strong AI argument: One can simulate intelligence but not possess it.

AI researchers largely interested in underlying principles.

To be intelligent is to think humanly

Is Intelligence Thinking humanly?

- 1960s “cognitive revolution” : information-processing psychology replaced prevailing orthodoxy of behaviorism
- Requires scientific theories of internal activities of the brain (how do you validate this?)
- Both approaches (cognitive science and cognitive neuroscience) are now distinct from AI

Course Objectives

Topics:

- Search (Uninformed search, informed search, genetic algorithms, partial observations, adversarial search)
- Playing games
- Logic and Inferences
- Reasoning (hidden markov models, probabilistic models)
- Learning (simple and reinforcement learning)

Exams 2 midterms and a final (each one is cumulative)

Many in-class labs to reinforce ideas

3 Small and 1 Large Programming Assignment

Grading

Component	Count	Weight
Quizzes/HW/Classwork	6-8	10%
Exam 1	1	15%
Exam 2	1	20%
Programming (small)	3	20%
Programming (large)	1	15%
Final Exam	1	20%