

Artificial Intelligence

CS 444 – Spring 2020

Dr. Kevin Molloy

Department of Computer Science

James Madison University

Outline for Today

- Define AI
- Course Objectives
 - Tentative Schedule
 - Required Reading
 - Grading and Contact Information

Define Intelligence

Are we intelligent?

If you can calculate a square root, are you intelligent?

CalcSQRT(s)

x = random guess

Loop

xNext = $\frac{1}{2} (x + S/x)$

x = xNext

Idea from al-Khwarizmi

What Makes up Artificial Intelligence?

Are self-driving cars intelligent?



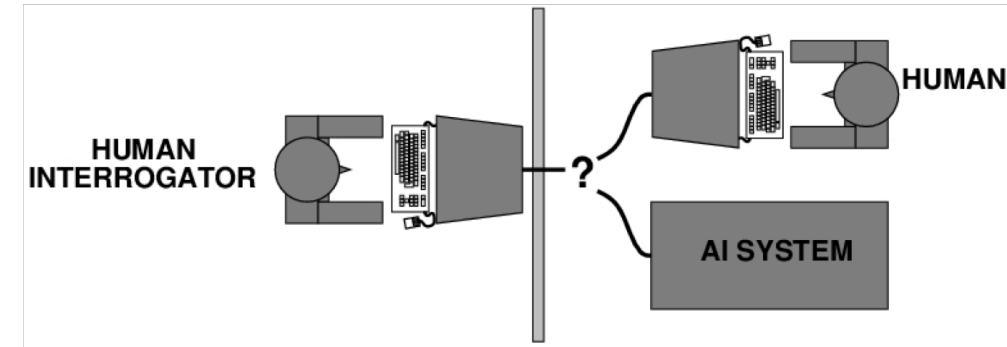
My Definition of AI

Using a non-human mechanism to either:

- 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 providing a set of "examples" (this is a specialty of AI known as machine learning).

Turing Test for an Intelligent Artifact

- Turing focused on "acting like a human" as an operational definition of artificial intelligence: Turing (1950).
- 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?

Issues with the Turing Test

Problem: Turing test is not reproducible, information/constructive, or amenable to mathematical analysis.

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

AI research is largely interested in the underlying principles, not whether the system can "fool" a human.

Is Intelligence thinking humanly?

- 1960s "cognitive revolution": information-processing psychology replaced prevailing orthodoxy of behaviorism.
- Require scientific theories of internal activity of the brain (how do you validate this?)
- Brains appear to not be as "modular" as software, so, hard to reverse engineer.
- Both cognitive science and cognitive neuroscience are now distinct fields from artificial intelligence.

What is Rationally behavior?

We use the term rational in a specific, technical way.

- The right think: that which is expected to maximize the goal achievement, given the available information.
- Doesn't necessary involve thinking – e.g., blinking reflex, but thinking should be in the service of a rational action.
- Rational: maximally achieving pre-defined goals.
- Rationality only concerns what decisions are made (not the thought process behind them).
- Being rational means maximizing your expected utility

Course Overview

Topics

- Search
- Uninformed search
- Informed search
- Genetic algorithms
- Partial observability
- Adversarial search
- Probabilistic Reasoning
- Reasoning w/Uncertainty (Markov processes)
- Reinforcement Learning

Exams: 2 midterms and 1 final exam

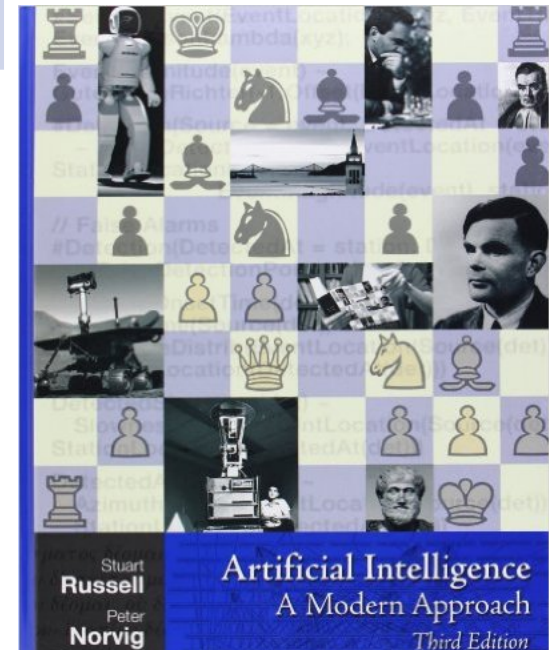
4 Small (or 3 small and 1 large) Programming Assignments

Many in-class labs to reinforce material

Poster on AI

Grading and Textbook

Component	Count	Weight
Homework/Classwork	6-8	10%
Exams (2 midterms and final)	3	60%
Exam 2	1	20%
Programming assignments(small)	3-4	20%
Programming assignment (large)	1	15%



Next Class

- Get the Textbook and read portions of Chapter 2
- Think about problems that require AI to solve