Welcome to CSci 4511W

Introduction to Artificial Intelligence I

Figure from Chaslot (2006)
Instructor (me)

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Textbook

Artificial Intelligence
A Modern Approach,
Russel and Norvig,
3rd edition
Class website

www.cs.umn.edu/academics/classes
Or google “umn.edu csci class”

Syllabus, schedule, other goodies

Moodle page will have grades and homework submission
CSci 4041H: Algorithms and Data Structures

Class Announcements

• 09/08/2015

ALL YOUR BASE ARE BELONG TO US.
Prerequisites

1. Competent programmer
2. Basic knowledge of functional programming (some lisp)
3. Understanding of data structures (graphs and trees)
4. Basic knowledge of formal logic (propositional and predicate)
25% Homework (-15% per day late)
20% Writing assignments
15% Project
10% Midterm (Feb. 24)
10% Midterm (April 6)
20% Final (May 9, 4:00-6:00pm)
    (overlaps with some math finals)
All exams are open book/notes
Syllabus

Grading scale:
93% A
90% A-
87% B+
83% B
80% B-
77% C+
73% C
70% C-
67% D+
60% D
Below F
Schedule

Week 1-4, Ch 1-4 - Intro & Search
Week 5-6, Ch 5, 17.5 - Game playing
Week 7-11, Ch 6-9 - Logic
Week 12-14, Ch 10, 12 - Planning
Week 15 - Special topics

There will be one assignment every week on Wednesdays (first one due Feb. 3)
Writing assignments

The writing assignments will use Latex (down with docx!)

The first few will be reviews of related topics and the last couple will tie into the project

These can be resubmitted within two weeks of being returned for another regrade (once)
The project will be a large part of the class and should be about 10-12 pages and include:

- Title, authors, abstract
- Introduction & problem description (1-2 pg)
- Literature review (2-3 pages)
- Description of your approach (2-3 pages)
- Analysis of results (1-2 pages)
- Conclusion and summary
- Bibliography
You may work with partner if you wish, but we will expect higher quality of work if you form a group, you must also submit a "the specific contributions of each member. The project should reflect about 50 hours of work per person (including reading, programming and writing).
You pick the project, but must use knowledge representation (something interesting)

Some ideas:
- AI for a game (3D tic-tac-toe, board games...)
- Spam filter (naive Bayes probability)
- Use A* to plan paths around Minneapolis
- Agent behavior in a system (evacuation or disaster rescue)
- Planning (snail-mail delivery, TSP)
Syllabus

Any questions?
AI

What is intelligence?
What is intelligence?
- No convenient definition

What is rational?
What is intelligence?
- No convenient definition

What is rational?
- Acts on knowledge to achieve “best outcome”
For a long time, the Turning Test was a supposed indication of intelligence. A person would question two entities and have to determine which one is the computer and human. This is not very popular anymore.
To pass the Turning Test, a computer needs the following:
- Natural language processing (as the test is written and not verbal)
- Knowledge representation (storage)
- Reasoning (logical conclusions)
- Machine Learning (extrapolation)
Agent/robot

The formal definition of a robot is not very useful either.

For our purpose, a robot/agent:
- Perceives the environment
- Adapts to changes
- Pursues a goal
Thus a rational agent acts to achieve the best outcome or goal (or best in expectation with uncertainty).

A limitedly rational agent makes the best choice with limited computation (also called online algorithms).
Agent/robot

Often times, fully exploring the state space is too costly (takes forever)

Chess: $10^{47}$ states (tree about $10^{123}$)
Go: $10^{171}$ states (tree about $10^{360}$)

At 1 million states per second...
Chess: $10^{109}$ years
Go: $10^{346}$ years
Simple computers have been built for hundreds of years.

For artificial intelligence to mature, it needed to borrow from other fields:
Math - logic and proofs
Statistics - probability
Economics - utility