Welcome!

CS5811 - Advanced Artificial Intelligence

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Outline

Information about me and you

Course logistics

Lecture topics

What is AI? (Chapter 1 - Introduction)

Agents and environments (Chapter 2 - Intelligent Agents)

Information about me

- Dr. Nilufer Onder
- Research interests:
  - Artificial intelligence planning
    Planning under uncertainty
    Temporal, concurrent planning
  - Project management
    Decision making under uncertainty
    Simulation based intelligent assistance
  - Increasing and broadening participation in STEM fields
    Student persistence
    Underrepresentation
    Career choices

Information about you

I shared a document for you to type information about yourself.
You may use this to select paper and project partners.
Please write the following by tomorrow
(Tuesday, 8/30/2016, 6:00pm):

- Name
- Degree program
- How long have you been at Michigan Tech?
- Have you taken CS4811? Have you taken other AI related courses?
- Background
- General interests
- Project topics you are interested in
- Do you have a project partner?

Course logistics

- 2 exams (20% each, **40%** total)
  Exam 1 is on Week 6, Exam 2 is on Week 12
  No final exam

- Written assignments and paper presentations (**40%**)

  - Written assignments based on course material
    Individual work
    Pdf submission on Canvas (typed or scanned)
  - Presentation of two recent papers
    Groups of 3, take turns to present
    20 minutes for presentation + 5 minutes for questions
    Need one 1.5 hour class for each set

- Group project (**20%**)

First paper presentation

- ▶ Form a group of three, at least two different countries
- ▶ Look at the IAAI (Innovative Applications of AI) proceedings. Go to aaai.org, click on "View list of conference proceedings", click on a year under IAAI.
- ▶ Use years 2014-2016.
  There are medical applications in 2013, if you are interested.
- ▶ Select only from deployed papers.
  20 available to choose from:
  2016 (3), 2015 (6), 2014 (7),
  2013 (4, GRADE was presented before)
- ▶ Write your choice and presentation date on the shared document (by Friday, 9/2).
- ▶ Presentations will be on Week 5 (Career Fair Week).

Semester project

- Form a group of three
  at least two different countries,
  different from the paper groups
- Decide on a project based on your interests
- The project should involve programming and generating or processing data
- You may use others' software or data but you have to make a contribution
- Submit a proposal by the end of the second week

Overview of the lecture topics

- Textbook: Russell and Norvig's
  "AI A Modern Approach (AIMA)".
  3rd edition, 2010.
- Prerequisite: CS4811
- Ch. 01: Introduction
- Ch. 02: Intelligent agents
- Ch. 03: Solving problems by searching
- Ch. 06: Constraint satisfaction problems
- Temporal Constraint Networks

Lecture topics (cont'd)

- ▶ Ch. 10: Classical planning
- ▶ Ch. 11: Planning and acting in the real world
- ▶ Ch. 13: Quantifying uncertainty
- ▶ Ch. 14: Probabilistic reasoning
- ▶ Ch. 15: Probabilistic reasoning over time
- ▶ Ch. 16: Making Simple Decisions
- ▶ Ch. 17: Making Complex Decisions
- ▶ Additional topics, time permitting

Topics not covered

- Ch. 04: Beyond classical search
- Ch. 05: Adversarial search
- Ch. 07: Logical agents
- Ch. 08: First-order logic
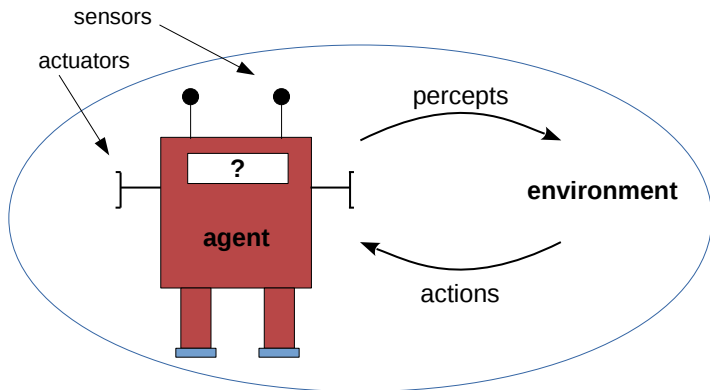- Ch. 09: Inference in first-order logic
- Ch. 12: Knowledge representation

What is AI?

Systems that:

think like humans	think rationally
act like humans	act rationally

- ► Cognitive science
- ► The Turing test
- ► Logic
- ► Doing the right thing
  - ► Knowledge representation
  - ► Reasoning (algorithms)

Agents and environments

- Agents include humans, robots, softbots, thermostats, etc.
- The agent function maps percept histories to actions:
$f : P^* \rightarrow A$

Basic agent types

In order of increasing generality (and complexity):

- simple reflex agents
- reflex agents with state
- goal-based agents
- utility-based agents

All of the basic types can be turned into learning agents

Sources for the slides

- AIMA textbook (3rd edition)
- AIMA slides (http://aima.cs.berkeley.edu/)