CIS 471/571, Fall 2012: Artificial Intelligence

P.S. Don’t forget to do course evaluations! Future generations will thank you!

Overview
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What to expect from the final

- You are allowed to use:
  - 1 sheet of handwritten notes (8.5"x11", 2-sided)
  - Non-programmable calculator (optional)
  - Russell & Norvig textbook (optional)
- Question types
  - Multiple choice concept questions
  - Applied knowledge questions, similar to homework
  - I will give you sample questions to study from, but my questions may end up looking somewhat different
- Study tips
  - Go through the slides.
  - Know how to formulate each problem type and execute each algorithm.
  - Know how the concepts relate to each other.
  - Understand the solutions to every single homework problem.
  - Write down everything you really want to remember on your paper.
    (Definitions, equations, pseudo-code, example problems.)

AI vs. Other Computer Science

- Software engineering:
  - Work with a client to define the problem.
  - You design the algorithms, logic, etc.
  - Implement it in code.
- Artificial intelligence:
  - Work with a client to define the problem.
  - Encode the problem in a formal language: domain, constraints, goal, features, heuristics, etc.
  - Let the computer solve it: A*, AC-3, Q-learning, variable elimination

Al Components

Representation:
Search problem, CSP problem, MDPs, BN, features

Reasoning:
Search algorithms (and heuristics), variable elimination

Learning:
Q-learning, approximate Q-learning, naive Bayes, lots more...

Additional knowledge:
Choice of representation, heuristics, parameter values, etc.

Acting Intelligently

- The point of intelligence is to select better actions.
- How do we pick actions?

Maximize Expected Utility.

Course Sections

Uninformed search:
Look for the goal

Heuristic search:
Look for the goal using a compass

Constraint satisfaction problems (CSPs):
A special class of search problem, with special algorithms and heuristics.

Adversarial search:
Pick the best action, assuming that the world is mean and/or random.

Markov decision processes (MDPs):
Act rationally in an uncertain world.

Reinforcement learning:
Learn while acting and act while learning in an MDP framework

Probability, Bayesian networks, independence, and inference:
Use all available evidence to predict unknowns