Midterm Review

CS 1571, Fall 2008

Scope and Format

- Chapters 2-6
  - Lecture notes
  - Textbook
  - Homework assignments

- Closed book, in-class exam (on Thursday, October 23)
  - no make-up possibilities

- Question types
  - multiple choice
  - short-answer
  - representation/problem solving
Search

• Problem Formulation (e.g., search space, operators, initial state, goal condition)

• Problem Solution (e.g., all the methods for searching the search space)

• Properties of search methods (e.g., completeness, optimality, space and time complexity in terms of b, d, m, etc.)

• Terminology

Uninformed Search

• Breadth first
• Depth first
• Depth limited
• Iterative deepening
• Uniform cost search

• Tree vs. graph search
Informed Search

- Best-first (greedy, A*)
  - Terminology (e.g., f(n), g(n), h(n), admissible heuristics, etc.)
- Local (e.g., hill climbing, simulated annealing, local beam, genetic algorithms)

Constraint Satisfaction

- Variables, values, constraints on values
- Methods and heuristics for CSP search (e.g., backtracking, constraint propagation, most constrained variable, least constrained value)
Adverserial Search (Games)

• Problem formulation
• Problem solution (e.g., minimax algorithm, alpha-beta pruning)
• Optimality

Example Multiple Choice Question

• Which of the following search algorithms finds the optimal solution?
  – breadth first
  – hill climbing
  – depth first
  – greedy search

  (Answer: breadth first)
Example Short Answer Question

• Under what conditions does A* produce the optimal solution?

Example Representation Question

• Consider the n-queens problem.
  – Formalize the 4-queens problem as a constraint satisfaction problem
Example (sketch of a) Problem-Solving Question

- Consider the search space below, where S is the start node, G is a goal node, arcs are labeled with a cost function, and nodes are labeled with a heuristic function (i.e., you will be given such a figure)
- For each of the following search strategies, list the nodes in the order in which they would be expanded
  - Depth-first
  - Breadth-first
  - Etc.

Summary

- You should be able to formalize/represent a problem intuitively described in English
- You should be able to solve such a problem, once represented
- You should know the correct terminology
- You should be able to compare, contrast, and evaluate all the different search methods