

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)

Adversarial 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