Review

CMPSCI 383
October 18, 2011

What you should know

Chapter 1: Introduction

- Different people approach AI with different goals: what are some of those goals?
- What is meant by “rational action”?
- What is the Turing test?
- What are some ways that brains and computer are different?
- What are some general features of the history of AI?

Chapter 2: Intelligent Agents

- What is an “agent”?
- How is the desirability of behavior determined?
- What is a “rational agent”?
- What does it mean to be autonomous?
- What’s a PEAS description of a task environment?
- What are properties of task environments?
  - Be able to give the properties of example task environments.
- What’s the difference between an agent function and an agent program?
- Four basic kinds of agents: what they can and can’t do
  - Reflex, model-based reflex, goal-based, utility-based, learning
- What are atomic, factored, and structured representations?

Chapter 26: Philosophical Foundations

- Weak and strong AI
- What are some common arguments against each?
- What is the Chinese Room argument and what is it about?
- What are some potential threats of AI to society?
- What is the "technological singularity"?
- What is "transhumanism"?

Chapter 3: Problem Solving as Search

- What does it take to "well-define" a search problem?
- Be able to formulate a problem as a search problem
- What are some real-world problems that can be formulated as search problems?
- What is abstraction, and why is it important?
- Understand the general tree and graph search algorithms: what's the difference?
  - Node, parent, child, leaf, frontier (open list), expanding, explored set (closed list)
- Understand the concept of whether a search algorithm is complete, optimal, its time and space complexity.

Chapter 3 continued

- Understand uninformed search methods: BFS, UCS, DFS, DLS
- Understand the ideas behind iterative deepening and bidirectional search.
- Be able to discuss at cocktail parties the relative advantages and disadvantages of the above searches.
- Informed search methods:
  - Evaluation function f
  - Path cost g
  - Heuristic function h

Chapter 3 continued

- Best-first search
- Greedy best-first search
- Understand A*
  - Be able to trace simple examples of A* execution
- Understand “admissibility” of heuristics
- Heuristic functions
  - Domination
  - Creating heuristic functions:
    - Relaxed problems
    - Combining heuristic functions

Chapter 3 continued

- Note: can skip Sec. 3.5.3: Memory-bounded heuristic search
- The summary of Sec. 3.7 (p. 108-109) is at a good level

Chapter 4: Local Search Algorithms

- Basic idea of local search
- Important characteristics of state-space landscape
- Understand hill-climbing, its advantages, disadvantages
- What is simulated annealing?
- Understand the basic ideas in genetic algorithms
- What about nondeterministic actions?
  - Contingency plans
- What about partial observations?
  - Belief states
- What is an on-line search problem, and what special problems can arise?

Chapter 5: Adversarial Search

- What makes a game two-player zero-sum with perfect information?
- What is a game tree?
- What is the minimax value of a node?
- What assumptions does minimax make about a game?
- Understand the minimax algorithm
- Understand alpha-beta pruning
- Use of evaluation functions
- Chance nodes and expectiminimax value
- What happens with partial observability (cocktail party level)?

General Information about the Midterm

- Closed book closed notes