CS 6601: Midterm study guide

Note: R&N = *AI, A Modern Approach*, by Russell & Norvig

- Adversarial search (R&N Chapter 5)
  - Observable games (e.g. isolation)
  - Minimax
  - Alpha-beta pruning
    - Performance improvement
  - Utility and evaluation functions
    - Sensitivity
  - Optimization tricks
    - Move-ordering
    - Symmetry
  - Iterative deepening
  - Multiplayer games
  - Probabilistic games
  - Partially observable games (e.g. poker)
- Search (R&N Chapter 3, uninformed and informed)
  - Uninformed
    - Breadth-first search
    - Depth-first search
    - Depth-limited search
    - Iterative deepening depth-first search
    - Uniform-cost search
  - Informed
    - Greedy search
    - A* search
    - Heuristics
      - Consistency/admissibility
      - Dominance
      - Derivation by relaxation
  - Bidirectional
  - Tridirectional
  - Tree vs. graph search
  - Completeness, space/time complexity, path optimality
- Agent design (R&N Chapter 2)
  - Rationality
  - PEAS
    - Performance
    - Environment
      - Observability
      - Deterministic/stochastic
      - Episodic/sequential
      - Static/dynamic
      - Discrete/continuous
      - Single/multi-agent
    - Actuators
    - Sensors
      - Uncertainty
  - Agent types
    - Reflex
    - Reflex with state
    - Goal-based
    - Utility-based
    - Learning
- Random algorithms (part of R&N Chapter 4)
  - Hill-climbing
  - Beam search
  - Iterative improvement
  - Simulated annealing
  - Genetic algorithms
  - Local vs. global maximum
  - Local stochastic search
- Constraint satisfaction problems (R&N Chapter 6)
  - Variables, domains, constraints
  - Standard search
  - Backtracking
  - Heuristics
    - Minimum remaining values
    - Least constraining value
  - Forward-checking
  - Arc consistency
  - Path consistency
  - Problem re-structuring
- Probability (R&N Chapters 13 and 14a, 14b)
  - Independence/dependence
  - Discrete/continuous variables
  - Joint distribution
  - Central Limit Theorem
  - Conditional probabilities
    - Bayes' Rule
    - Chain Rule
    - Conditional independence
  - Bayesian networks
    - How to construct
    - Local independence
    - Inference
      - Exact (calculation)
        - Enumeration
        - Variable elimination
      - Inexact (sampling)
        - Rejection sampling
        - Stochastic simulation
        - MCMC simulation
  - Decision/utility theory
    - Expected value