

Study Guide For Spring 2003 COSC 159 Final Example

Chapter 1

- Four approaches of AI
- Rationality
- Foundations of AI

Chapter 2

- Agents, environments, percepts, etc.
- Different types of agents, know the essential characteristics. What makes up a simple reflex agent? How about a goal-based agent? What about a utility based agent? What approaches are used to implement the different kinds of agents?

Chapter 3

- Problem and goal formulation
- Search terminology
- Well defined search problems
- Optimality, completeness
- Uninformed search strategies
 - Depth-first
 - Breadth-first
 - Uniform cost
 - Depth-limited
 - Iterative deepening
- Complexity of searches
- Repeated states and partial information

Chapter 4

- Informed searches
- Greedy best-first search
- A* search
- Evaluation function
- Heuristic function
- Problem relaxation
- Admissible heuristic
- Domination
- Local searches (hill climbing, simulated annealing, genetic algorithm, local beam search)

Chapter 6

- Formal definition of a game
- Terminology
- Minimax-algorithm

- Alpha-beta pruning
- Cutoff tests
- Evaluation functions
- Games with chance
- Expectiminimax

Chapter 7

- Knowledge based agents
- Knowledge base, sentences, representation languages, etc.
- Logic
- Possible models, models, entailment
- Inference, model checking, soundness, completeness
- Propositional logic
- Equivalence, validity, satisfiability
- Reasoning patterns
- CNF, resolution
- Forward and backward chaining

Chapter 8

- Composibility
- Objects, relations, functions
- Domains, domain elements
- Models
- Symbols and interpretations, arity
- First-order logic
- Quantifiers
- Knowledge engineering process

Chapter 9

- Inference rules
- Skolemization
- CNF
- Propositionalization
- Generalized Modus Ponens, definite clauses
- Substitution and unification
- Forward and backward chaining
- Prolog
- Resolution

Chapter 13

- Uncertainty
- Probability
- Decision theory
- Basic probability notation

- Prior probabilities
- Conditional probabilities
- Product rule
- Axioms of probability
- Joint probabilities
- Marginalization
- Independence
- Bayes' rule

Chapter 14

- Bayesian networks
- Constructing Bayesian networks
- Conditional probability tables
- Full joint distribution
- Conditional independence in Bayesian networks
- Exercises 14.1-14.3

Chapter 16

- Utility function
- Expected utility
- Maximum expected utility
- Basis of utility theory (not in lecture, but should study)
- Section 16.3
- Section 16.5, decision networks, primarily creating them
- Exercises 16.1, 16.2, 16.4, 16.6, 16.11 a

Chapter 18

- Forms of learning, supervised, unsupervised, reinforcement
- Ockham's razor
- Realizability
- Decision trees
- Decision tree induction
- Information content, information gain
- Evaluating learning algorithm performance
- Exercises 18.1-18.7
- Construct a decision tree for the credit history data using information theory

Chapter 20

- Sections 20.1, 20.2 (Naïve Bayes), 20.4 (Nearest Neighbors), 20.5, (Neural Networks)
- Know the terminology and ideas.
- Exercises 20.4, 20.11