TDDC17 Reading List 2016

Patrick Doherty

2016

It is important to read the pages explicitly specified in the bullet list for each chapter in addition to reviewing the book exercises to a get a feel for difficulty level in the exam questions. It is also important to review the slides. Questions may be taken directly from them. It is definitely a good thing if you have completed the labs before the exam.

The exam generally consists of around 8 questions. Most often, there will be questions on the exam chosen from the following:

1. Either the Turing or the Newell and Simon articles distributed during the course.
2. Conceptual question about parts and types of intelligent agents (ch. 2)
3. A* search and proof of optimality. Admissible heuristics. (ch. 3)
4. MinMax search and alpha-beta pruning. (ch. 5)
5. Constraint satisfaction. (ch. 6)
6. Conceptual questions about logic and also resolution theorem proving. (ch. 7-9)
7. Automated Planning (ch. 10-11)
8. Reasoning about uncertainty: Bayesian Networks. (ch. 13-14)
9. Decision Tree learning and Reinforcement learning (ch. 18, 21)

Specific Reading Guidelines:

- Chapter 1, Introduction, pp.1-33.
  - Read, no specific questions except maybe about the Table on p.2.
  - Turing article [**?**]
  - What is a Turing Machine? What is the Turing Test? Describe using diagrams.
  - Look at slides.
- Chapter 2, Intelligent Agents, pp.34-63.
  - Read, some questions are possible.
  - Review exercises 2.4 - 2.6 (p. 62)
  - Draw diagram of different agent types, explain it. Utility agent's not required. Different task environment types, PEAS(p.38).
  - Look at the slides.

- Chapter 3, Solving Problems by Searching, pp.64-118.
  - Read sec.3.1 - 3.4, 3.5.1-2, 3.6.1-4, some questions are possible.
  - Review exercises 3.2, 3.10, 3.15, 3.22 (pp.112-17)
  - Conceptual definitions, Measuring problem solving performance. Pros and cons of different search algorithms.
  - sec. 3.5.1-2: A* search and proof of optimality. Very important.
  - sec. 3.6.1-4: Be aware of heuristic functions, ways to construct them.
  - Newell and Simon article [**?**]
  - What is a physical symbol system? The PSS hypothesis. Problem solving as search, heuristic search.
  - Look at the slides.
- Chapter 4, Beyond Classical Search, pp.120-160.
  - Read sec. 4.1, some questions are possible.
  - Look at the slides.
- Chapter 5, Adverserial Search, pp.161-201.
  - Read sec. 5.1-3, some questions are possible.
  - Understand Minimax search, alpha-beta pruning. Be able to do an example.
  - Look at the slides.
- Chapter 6, Constraint Satisfaction Problems, pp.202-233.
  - Read sec. 6.1-3, some questions are possible.
  - Review exercises 6.6, 6.8, 6.10 (pp. 230-233)
  - AC3 algorithm, backtracking search for csps, arc, node and path consistency, forward checking, variable and value ordering
  - Look at the slides.
- Chapter 7, Logical Agents pp.234-284
  - Read sec 7.1-6, 7.7.1-3, some questions are possible.
  - Review exercises 7.2, 7.4, 7.6, 7.7, 7.10, 7.12, 7.17, 7.19 (pp. 280-83)
  - Assumption: familiarity with propositional logic
  - Basic concepts of logic, resolution proof, CNF, SAT-solving,.
  - What are some of the weaknesses with propositional logic when modeling the Wumpus World?
  - Should understand validity, satisfaction, consistency, models, inference, etc.
  - Should be able to model a problem in logic and do resolution theorem proving.
  - Should understand DPLL, WalkSAT, and SATPLAN.
  - Look at the slides.

- Chapter 8, First-Order Logic, pp. 285-321
  - Read sec. 8.1-3, some questions are possible.
  - Review exercises 8.2, 8.9 (pp. 315-16)
  - Assumption: familiarity with 1st-order logic. Basics, syntax, semantics.
  - Sec 8.3.4: look at the wumpus world, compare propositional and 1st-order representations.
  - Look at the slides.
- Chapter 9, Inferences in 1st-Order Logic, pp. 322-366.
  - Read sec. 9.1-2, 9.5.1-5.3
  - Review exercises 9.4, 9.23 (pp. 361-365)
  - Should be able to do a resolution proof with unification, skolemization, cnf, etc.
  - Look at the slides.
  - an appendix will be provided with steps for putting formulas into CNF form.
- Chapter 10, Classical Planning, pp. 366-400.
  - Read sec. 10.1-2, 10.4, some questions are possible.
  - Review exercises 10.1, 10.5 (pp. 396-97)
  - The basic classical planning problem, planning with state space search, partial order planning, planning using logic, basic ideas behind TALplanner.
  - Look at the slides. Exam questions may be taken explicitly form the slides.
- Chapter 11, Planning and Acting in the Real World, pp. 401-436.
  - Read sec. 11.2, some questions are possible.
  - Review exercises 10.1, 10.5 (pp. 396-97)
  - A question on hierarchical planning is possible.
  - Look at the slides. Exam questions may be taken explicitly from the slides.
- Chapter 13, Quantifying Uncertainty, pp. 480-509
  - The whole chapter.
  - Read the whole chapter, some questions are possible.
  - Review exercises 13.5, 13.8, 13.19 (pp. 506-509)
  - This chapter provides the basis for understanding what probabilistic reasoning is about. It is a pre-requisite for the next chapter.
  - Look at the slides.

- Chapter 14, Probabilistic Reasoning, pp. 510-565.
  - Read sec 14.1-2, 14.4.1, some questions are possible.
  - Review exercises 14..4, 14.11, 14.13a-c
  - Be able to answer questions about and work with Bayesian Networks.
  - An appendix will be provided for basic probability formulas related to BN, so no need to memorize.
  - Look at the slides.
- Chapter 18, Learning from Example, pp. 693-767
  - Read sec. 18.1-4, 18.6-7
  - Review exercises 18.3, 18.8, 18.26a (pp. 763-767)
  - Look at the slides! Exam questions may be taken explicitly from the slides.
  - Understand supervised learning, training, classification, regression, decision trees, linear models, neural networks, overfitting, curse of dimensionality
- Chapter 21, Reinforcement Learning, pp. 830-859
  - Read sec. 21.1-3, (also ch 17: 17.1-2 for background)
  - Understand the Q-learning algorithm and concepts learnt from the lab.
  - Review Q-learning example from lecture
  - Look at the slides! Exam questions may be taken explicitly from the slides.
  - Understand reinforcement learning, utility, policy, Q-learning, exploration, curse of dimensionality

References