

Comprehensive Exam Syllabus for Artificial Intelligence

Effective: August 2015

Created: March 30, 2015

Introduction

This syllabus covers artificial intelligence. The text for this syllabus is *Artificial Intelligence: A Modern Approach, 3rd edition* by Stuart Russell and Peter Norvig.

References

- S. Russell, P. Norvig, *Artificial Intelligence: A Modern Approach (3rd ed)*, Prentice Hall, 2009, Englewood Cliffs, NJ, ISBN 0-13-6042597.

Syllabus Outline

- The Concept of an Agent (Chapter 2; pp. 34-59, 3rd ed)
 1. Reflex-based agents
 2. Goal-based agents
 3. Utility-based agents
 4. Situated agents
- Search Methods (Chapters 3, 4, 5, and 6; pp. 64-227, 3rd ed)
 1. Basic search (depth-first, breadth-first, uniform-cost, iterative deepening)
 2. Informed search (Best-first, Greedy search, A*, heuristics)
 3. Iterative-improvement (hill-climbing, gradient descent, simulated annealing, genetic algorithm)
 4. Constraint satisfaction problems
 5. Adversarial search
- Logic and Inference (Chapters 7, 8, and 9; pp. 234-357, 3rd ed)

1. Syntax and semantics of propositional logic
 2. Syntax and semantics of first-order logic
 3. Inference in first-order logic
- Probabilistic and Uncertain Reasoning (Chapters 13, 14, and 15; pp. 480–599, 3rd ed)
 1. Uncertainty
 2. Probabilistic reasoning
 3. Probabilistic reasoning over time
 - Learning (Chapters 18, 19, and 20; pp. 693–825, 3rd ed)
 1. Learning from observations
 2. Knowledge in learning
 3. Statistical learning methods