CS 5200: ARTIFICIAL INTELLIGENCE METHODS

Semester Hours: 3.0  
Contact Hours: 3  
Coordinator: Qing Tian  
Text: Artificial Intelligence: A Modern Approach  
Author(s): RUSSELL AND NORVIG  
Year: 2010

SPECIFIC COURSE INFORMATION

Catalog Description:

Intermediate AI programming with application to representative problems requiring searching, reasoning, planning, matching, deciding, parsing, seeing and learning. Prerequisite: Full Admission to MS in CS program or consent of department.

Course type: ELECTIVE

SPECIFIC COURSE GOALS

- I can explain the major challenges facing AI, both from a theoretical (research) and a practical (application) standpoint.
- I understand the properties of AI task environments well enough to give a correct PEAS (Performance, Environment, Actuators, Sensors) description of a specific task environment.
- For simple AI problems, I can formulate a correct abstract model consisting of states, actions, transitions, goals and costs.
- I can explain and implement basic AI search algorithms, including blind searches (depth-first, breadth-first) and informed searches (best-first and A*).
- I can describe and compare Hill-climbing search, simulated annealing, local beam, search and genetic algorithms.
- I can explain and implement, in script or pseudocode, the minimax algorithm and the alpha-beta pruning algorithm.
• I can describe and explain some agent-based AI architecture (e.g., game-playing agents).
• I can explain how propositional theorem-proving works.
• I understand the concepts of first-order predicate logic (FOPL) well enough to explain how forward- and backward-chaining algorithms work.
• I can analyze relevant research and communicate my findings.

LIST OF TOPICS COVERED

• Introduction to AI
• Problem Solving and Search
  - State Space
  - Blind Search, Heuristic Search (including A*), Adversary Search
• Knowledge Representation Tools
  - Logic
  - Semantic Nets, Frames
  - Probability
  - Fuzzy Logic
  - One or more of the following optional topics: transition nets (including ATNs), inductive logic, non-monotonic logic, neural nets
• Integrated AI Systems
  - Planning Systems
  - Rule-based Expert Systems
  - Constraint Propagation Systems
  - Truth Maintenance Systems
  - Learning Systems
  - One or more of the following optional topics: robotic systems, vision systems, natural language systems, neural network systems, connectionist systems, theorem-proving systems.
• Evaluation and Overview
  - Ethical Issues in AI
  - What Computers Can Do
  - What Computers Still Can't Do