COMP 3190 – Introduction to Artificial Intelligence

Calendar Description: Principles of artificial intelligence; problem solving, knowledge representation and manipulation; the application of these principles to the solution of ‘hard’ problems.
Prerequisite: COMP 2140.
This course is a prerequisite for: COMP 4190, COMP 4200 and COMP 4360.

Outline

1) Problem Solving (1 ¼ week)
   Problem solving; declarative problem representation, searching problem spaces; state-space search; problem-reduction search
2) Search (2 weeks)
   Basic search strategies: breadth-first search; depth-first search, heuristic search: hill climbing; beam search; best first
3) Knowledge Representation (3 ⅔ weeks)
   Basic representation: first-order logic, representation in clause form; reasoning with resolution and resolution refutation, representation and reasoning in Prolog (will be spread throughout the course), rule-based representations, structured representations: semantic nets; frames
4) Reasoning with Uncertainty (1 week)
   Reasoning with incomplete information; reasoning with imprecise information
5) Expert Systems (2/3 week)
   Organization of expert systems; knowledge engineering, surface reasoning; deep reasoning
6) Natural Language Understanding (1 ¾ weeks)
   Strategies for NLU; syntax analysis; semantics analysis
7) Neural Networks (1 week)
   Organization of neural networks, one-layer feedforward networks; backpropagation networks
8) Planning (1 week)
   Representation of planning problems; state-based representations, solution of planning problems; frame problem
9) Distributed Artificial Intelligence (1 week)
   Problem decomposition and distribution to problem-solving agents, communication among agents