Artificial Intelligence

BEG471CO

Year IV Semester: I

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory ****	**Practical**	
3	**1**	**3/2**	20	25	80	-	125

Objectives:

1. Introduction [2 hour]
   1.1 Definitions
   1.2 Goals of AI
   1.3 Challenges of AI
   1.4 AI approaches
   1.5 AI techniques
   1.6 Applications of AI
2. Agents [5 hour]
   2.1 Introduction to agents
   2.2 Agent's performance
   2.3 Example of Agents
   2.4 Rationality and omniscience
   2.5 Types of agent environment
   2.6 Agent architecture
   2.7 PEAS (vaccum cleaner agent, human agent, robotic agent, taxi driving agent, 8-queen problem etc)
   2.8 Types of agent (simple reflex, goal based, model based, utility agent, learning agent)
3. Problem solving using searching [8 hours]
   3.1 Uninformed Search

- 3.1.1 Problem solving agents
- 3.1.2 Problem types
- 3.1.3 Problem formulation
- 3.1.4 Example problems
- 3.1.5 Basic search algorithms (BFS, DFS, Depth limited search, uniform cost search, iterative deepening, bidirectional search)
- 3.1.6 Comparative study of all uninformed search strategies (completeness, optimality, time complexity and space complexity)

3.2 Informed search

- 3.2.1 Best first (greedy) search
- 3.2.2 A* Search
- 3.2.3 Heuristic function
- 3.2.4 Hill Climbing and problems
- 3.2.5 Comparative Study of each type of searching
- 3.2.6 Simulated annealing
- 3.2.7 Genetic Algorithm

4. Adversial Search and Constraint satisfaction problem [5 hours]
   - 4.1 Games
   - 4.2 Perfect games
   - 4.3 Game tree and formal definition
   - 4.4 Min Max problem
   - 4.5 Alpha beta pruning algorithm
   - 4.6 CSP Problem and examples
   - 4.7 Crypto arithmetic problems and solutions
5. Knowledge Representations [8 hours]
   - 5.1 Knowledge and its types
   - 5.2 Logic
   - 5.3 Semantic Nets
   - 5.4 Propositional logic vs FOPL
   - 5.5 Resolution in FOPL
   - 5.6 Frames
6. Learning System [4 hours]
   - 6.1 Rote learning
   - 6.2 Learning from example: inductive learning methods
   - 6.3 Decision trees
   - 6.4 Explanation based learning
   - 6.5 Reinforcement learning
7. Reasoning [4 hours]
   - 7.1 Monotonic Reasoning

7.2 Statistical Reasoning (Bayesian Network)
7.3 Uncertainty in reasoning
7.4 Case based reasoning

8. Expert System [4 hours]
   8.1 Human Expert vs expert system
   8.2 Expert System Structure
   8.3 Expert system example
   8.4 Characteristics of expert system
   8.5 Knowledge acquisition
   8.6 Knowledge base
   8.7 Inference engine
   8.8 Forward chaining and backward chaining
   8.9 Design of expert system
9. Artificial Neural networks [3 hours]
   9.1 Research history
   9.2 Model of artificial neuron
   9.3 Neural networks architectures
   9.4 Learning methods in neural networks
   9.5 Perceptron Network, Multi-layered feed forward network, Hopfield networks
   9.6 Application of neural networks
10. Natural language processing [2 hours]
    10.1 introduction
    10.2 components of natural language processing
    10.3 natural language understanding
    10.4 natural language generation
    10.5 steps in language understanding and generation

Laboratory

Students must do labs on prolog, C or java to cover following topics

- solving family relation problem
- GCD in prolog
- Tower of Hanoi
- Wumpus world
- Using prolog to understand (variable, rules, input output, arithematic operations, recursion in prolog)

Students must do case study on expert system or natural language processing also.