Artificial Intelligence

BCA, Elective

Course Objectives:

In this course the students will learn the basic knowledge of artificial intelligence.

Course Contents:

1. Introduction **2 hours**

1.1 Introduction to Artificial Intelligence
1.2 Foundation of Artificial Intelligence
1.3 History of Artificial Intelligence

2. Problem solving **14 hours**

2.1 Problem Space
- 2.1.1 Problem formulation
- 2.1.2 Problem types
- 2.1.3 Well-defined problems
- 2.1.4 Measuring problems-solving performance

2.2 Search Strategies
- 2.2.1 Breadth -first search
- 2.2.2 Depth-first search
- 2.2.3 Bi-directional search
- 2.2.4 Comparing search strategies

2.3 Informed Search
- 2.3.1 Best first search
- 2.3.2 Greedy search
- 2.3.3 Heuristic Functions
- 2.3.4 Iterative deepening A* search
- 2.3.5 Hill climbing

2.4 Game Playing

3. Knowledge and Reasoning **14 hours**

3.1 Representation, Reasoning and Logic
- 3.1.1 Representation and Mappings
- 3.1.2 Approaches to knowledge Representation
- 3.1.3 Issues in Knowledge Representation
- 3.1.4 Inference, Logic, syntax, semantics

3.2 Prepositional Logic
- 3.2.1 Computable function and predicates
- 3.2.2 Resolution
- 3.2.3 Natural Deduction

3.3 Knowledge representation using Rules
- 3.3.1 Procedural knowledge
- 3.3.2 Declarative knowledge
- 3.3.3 Logic Programming
- 3.3.4 Forward versus backward chaining
- 3.3.5 Matching

3.4 Symbolic Reasoning
- 3.4.1 No monotonic reasoning
- 3.4.2 Logics of No monotonic reasoning
- 3.4.3 Implementation Issues

3.5 Statistical Reasoning
- 3.5.1 Probability and Bayes' theorem
- 3.5.2 Bayesian Network

4. Learning **12 hours**

4.1 Learning from observation
- 4.1.1 Prior Knowledge
- 4.1.2 Inductive learning
- 4.1.3 Hypothesis

4.2 Learning in neural and belief network
- 4.2.1 Brain comparison
- 4.2.2 Neural net and notation
- 4.2.3 Pereeptron model
- 4.2.4 Multi-layer feed-forward networks
- 4.2.5 Back-propagation learning

4.3 Reinforcement Learning
- 4.3.1 Passive learning in a known environment
- 4.3.2 Passive learning in a known environment
- 4.3.3 Active learning in a unknown environment
- 4.3.4 Genetic Algorithms

5. Application **3 hours**
- 5.1. Neural Network
- 5.2. Expert System
- 5.3. Natural Language processing

Laboratory

Any Programming language like LIIP, Prolong, Python, Java that can support the AI content and issues should be chosen and each student should practice to cover the course content topics

Reference Books:

1. Stuart Russel and Peter Norvig: *Artificial Intelligence A Modern Approach,* Pearson.
2. Patrick Henry Winston: *Artificial Intelligence*, Pearson.
3. Elaine Rich and Kevin Knight: *Artificial Intelligence*, MeGraw Hill