ARTIFICIAL INTELLIGENCE

CT 653

Lecture : 3 **Year : III**
Tutorial : 1 **Part : II**

Practical : 1.5

Course Objectives:

- To provide basic knowledge of Artificial Intelligence
- To familiarize students with different search techniques
- To acquaint students with the fields related to AI and the applications of AI

1. Introduction (4 hours)

1.1. Definition of Artificial Intelligence

1.2. Importance of Artificial Intelligence

1.3. AI and Related Fields

1.4. Brief History of Artificial Intelligence

1.5. Applications of Artificial Intelligence

1.6. Definition and Importance of Knowledge, and Learning

2. Problem Solving (4 hours)

2.1. Defining Problems as a State Space Search,

2.2. Problem Formulation

2.3. Problem Types, Well-defined Problems, Constraint Satisfaction Problem,

2.4. Game Playing, Production Systems

3. Search Techniques (5 hours)

3.1. Uninformed Search Techniques - Depth First Search, Breadth First Search, Depth Limit Search, and Search Strategy Comparison,

3.2. Informed Search Techniques - Hill Climbing, Best First Search, Greedy Search, A* Search; Adversarial Search Techniques - Minimax Procedure, Alpha Beta Procedure

4. Knowledge Representation, Inference and Reasoning (8 hours)

4.1. Formal Logic - Connectives, Truth Tables, Syntax, Semantics, Tautology, Validity, Well-formed-formula,

4.2. Propositional Logic, Predicate Logic, FOPL, Interpretation, Quantification, Horn-clauses,

4.3. Rules of Inference, Unification, Resolution Refutation System (RRS), Answer Extraction from RRS, Rule Based Deduction System,

4.4. Statistical Reasoning - Probability and Bayes' Theorem and Causal Networks, Reasoning in Belief Network

5. Structured Knowledge Representation (4 hours)

5.1. Representations and Mappings,

5.2. Approaches to Knowledge Representation,

5.3. Issues in Knowledge Representation,

5.4. Semantic Nets, Frames,

5.5. Conceptual Dependencies and Scripts

6. Machine Learning (6 hours)

6.1. Concepts of Learning,

6.2. Learning by Analogy, Inductive Learning, Explanation Based Learning

6.3. Neural Networks,

6.4. Genetic Algorithm

6.5. Fuzzy Learning

6.6. Boltzmann Machines

7. Applications of AI (14 hours)

7.1. Neural Networks

7.1.1. Network Structure

7.1.2. Adaline Network

7.1.3. Perceptron

7.1.4. Multilayer Perceptron, Back Propagation

7.1.5. Hopfield Network

7.1.6. Kohonen Network

7.2. Expert System

7.2.1. Architecture of an Expert System

7.2.2. Knowledge Acquisition, Induction

7.2.3. Knowledge Representation, Declarative Knowledge, Procedural Knowledge

7.2.4. Development of Expert Systems

7.3. Natural Language Processing and Machine Vision

7.3.1. Levels of Analysis: Phonetic, Syntactic, Semantic, Pragmatic

7.3.2. Introduction to Machine Vision

Practical:

- Laboratory exercises should be conducted in either LISP or PROLOG. Laboratory exercises must cover the fundamental search techniques, simple question answering, inference and reasoning.

References:

1. E. Rich and Knight, Artificial Intelligence, McGraw Hill, 2009.
2. D. W. Patterson, Artificial Intelligence and Expert Systems, Prentice Hall, 2010.
3. P. H. Winston, Artificial Intelligence, Addison Wesley, 2008.
4. Stuart Russel and Peter Norvig, Artificial Intelligence A Modern Approach, Pearson, 2010

Evaluation Scheme

There will be questions covering all the chapters in the syllabus. The evaluation scheme for the question will be as indicated in the table below:

Unit	Hour	Marks Distribution*
1	4	7
2	4	7
3	5	9
4	6	14
5	4	7
6	6	10
7	14	26
Total	***45***	***80***

* There may be minor deviation in marks distribution.