

ARTIFICIAL INTELLIGENCE

Module 1

12Hrs

What is Artificial Intelligence? AI Technique, Level of the Model, Problem Spaces, and Search: Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs. Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Best-first Search, Problem Reduction, Constraint Satisfaction, Means-ends Analysis, **Knowledge Representation**: Representations and Mappings, Approaches to Knowledge Representation, **Using Predicate Logic**: Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural Deduction. **Using Rules**: Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning, Matching, Control Knowledge. **Symbolic Reasoning Under Uncertainty**: Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem-solver, Depth-first Search, Breadth-first Search. **Weak and Strong Slot-and-Filler Structures**: Semantic Nets, Frames, Conceptual Dependency Scripts, CYC.

Module 2

10Hrs

Game Playing: The Minimax Search Procedure, Adding Alpha-beta Cutoffs, Iterative Deepening. **Planning**: The Blocks World, Components of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning Other Planning Techniques. **Understanding**: What is Understanding, What Makes Understanding Hard?, Understanding as Constraint Satisfaction. **Natural Language Processing**: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing, Statistical Natural Language Processing, Spell Checking.

Module 3

8Hrs

Learning: Rote Learning, Learning by Taking Advice, Learning in Problem-solving, Learning from Examples: Induction, Explanation-based Learning, Discovery, Analogy, Formal Learning Theory, Neural Net Learning and Genetic Learning. **Expert Systems**: Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition.

Text Book:

1. Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill, 3rd ed., 2009

References:

- 1) Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI., 2010
- 2) S Kaushik, Artificial Intelligence, Cengage Learning, 1st ed. 2011