

DSPC3003 ARTIFICIAL INTELLIGENCE (3-0-0)

Course Objectives:

- To train the students to understand different types of AI agents.
- To understand various AI search algorithms.
- Fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation.

Module-I: (06 hours)

Introduction to Artificial Intelligence: Definition, History and Evolution of AI, Foundation of AI, Applications of AI in real life, Agents & environment, nature of environment, structure of agents Intelligent Agents, Rationality, PEAS

Module-II: (06hours)

Problem Solving: Defining the problem as state space search, production system, problem characteristics, issues in the design of search programs. Identification of AI Problems and Problem formulation by search, Examples on AI problem formulation (Vacuum Cleaner Problem, Water Jug Problem, 8-Puzzle problem, 8-queen problem, Monkey Banana Problem)

Module-III: (10 hours)

Search Techniques: - Iterative search, Uninformed search (Breadth-first search, Depth-first search, Uniform cost search), Informed (Heuristic) Search Strategies (Greedy best-first search, A* Search, hill climbing search), Constraint Satisfaction Problem (CSP), Means-End-Analysis (MEA).

Adversarial search: Games, optimal decisions & strategies in games, The Mini-Max algorithm, optimal decisions in multiplayer games, Alpha-Beta Pruning, Evaluation functions, Cutting off search.

Module-IV: (12 hours)

Knowledge Representation & Reasoning: Knowledge representation issues, representation & mapping, approaches to knowledge representation, issues in knowledge representation. Logical agents, Knowledge-Based Agents, Logic, Reasoning Patterns in Propositional Logic & First-Order Logic, Resolution Using Propositional logic & First-Order Logic. Unification and Lifting, Forward Chaining, Backward Chaining, Uncertainty – Reasoning with uncertainty, Markov Models, Hidden Markov Models, Bayes' rule, Bayes' Nets: Representation, Independence and Inference.

Module-V: (06hours)

Learning: What Is Learning? Forms of Learning, Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Inductive learning, Neural net learning & Genetic learning.

Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

Course outcomes:

1. Understand the informed and uninformed problem types and apply search strategies to solve them.
2. Apply difficult real-life problems in a state space representation so as to solve those using AI techniques like searching and game playing.
3. Design and evaluate intelligent expert models for perception and prediction from intelligent environment.
4. Formulate valid solutions for problems involving uncertain inputs or outcomes by using decision making techniques.
5. Demonstrate and enrich knowledge to select and apply AI tools to synthesize information and develop models within constraints of applications.

Text Book:

1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, Prentice- Hall, 2010

Reference Books:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGrawHill publications, Third Edition, 2009.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.
3. Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill, 3rd ed., 2009
4. Nils J Nilsson, Artificial Intelligence: A New Synthesis, Morgan Kaufmann Publications, 2000.