

Course No: MCA- 4EL3
Course Title: Artificial Intelligence and Neural Networks

Unit I

Searching state-spaces : Use of states and transitions to model problems , Breadth-first, depth-first and related types of search , A* search algorithm , Use of heuristics in search

Reasoning in logic : Brief revision of propositional and predicate logic
Different characterizations of reasoning , Generalized modus ponens
Resolution , Prolog , Forward and backward chaining

Unit II

Knowledge Representation : Diversity of knowledge , Inheritance hierarchies , Semantic networks , Knowledgebase ontologies

Handling uncertainty : Diversity of uncertainty , Probability theory in intelligent systems , Dempster-Shafer theory

Machine Learning : Induction of knowledge , Decision tree learning algorithms

Unit III

Intelligent agents : An architecture for intelligent agents
Multi-agent systems

Nature and Goals of Neural Computing : Comparison with rule-based AI
Overview of network architectures and learning paradigms

Binary Decision Neurons : The McCulloch-Pitts model
Single-layer perceptrons and their limitations

Unit IV

The Multilayer Perceptron : The sigmoid output function , Hidden units and feature detectors , Training by error backpropagation , The error surface and local minima , Generalization, how to avoid 'overtraining'

The Hopfield Model : Content addressable memories and attractor nets
Hopfield energy function , Setting the weights , Storage capacity

Topographic maps in the brain *Self-Organising Nets* :
The Kohonen self-organising feature map

References :

Artificial Intelligence – Russell, "A Modern Approach"; 2/e ; Pearson Education

Patterson , " Introduction to Artificial intelligence and expert systems" , Pearson Education

Neural Computing: An Introduction; R Beale and T Jackson; Institute of Physics Publishing.