

RO8007 NEURAL NETWORKS AND FUZZY SYSTEMS

DETAILED SYLLABUS

OBJECTIVES:

The student should be made to:

- Learn the various soft computing frame works
- Be familiar with design of various neural networks
- Be exposed to fuzzy logic
- Learn genetic programming
- Be exposed to hybrid systems

UNIT I INTRODUCTION TO NEURAL NETWORKS

Differences between Biological and Artificial Neural Networks - Typical Architecture, Common Activation Functions, McCulloch - Pitts Neuron, Simple Neural Nets for Pattern Classification, Linear Separability - Hebb Net, Perceptron, Adaline, Madaline - Architecture, algorithm, and Simple Applications.

UNIT II PATTERN ASSOCIATION

Training Algorithms for Pattern Association - Hebb rule and Delta rule, Hetero associative, Auto associative and Iterative Auto associative Net, Bidirectional Associative Memory - Architecture, Algorithm, and Simple Applications.

UNIT III COMPETITION, ADAPTIVE RESONANCE AND BACK PROPAGATION NEURAL NETWORKS

Kohonen Self Organising Maps, Learning Vector Quantization, Counter Propagation - Architecture, Algorithm and Applications - ART1 and ART2 - Basic Operation and Algorithm, Standard Backpropagation Architecture, derivation of Learning Rules, Boltzmann Machine Learning - Architecture, Algorithm and Simple Applications.

UNIT IV CLASSICAL AND FUZZY SETS AND RELATIONS

Properties and Operations on Classical and Fuzzy Sets, Crisp and Fuzzy Relations - Cardinality, Properties and Operations, Composition, Tolerance and Equivalence Relations, Simple Problems.

UNIT V MEMBERSHIP FUNCTIONS

Features of membership function, Standard forms and Boundaries, fuzzification, membership value assignments, Fuzzy to Crisp Conversions, Lambda Cuts for fuzzy sets and relations, Defuzzification methods.

APPLICATIONS: Neural Networks: Robotics, Image compression, Control systems - Fuzzy Logic: Mobile robot navigation, Autotuning a PID Controller.

TEXT BOOKS:

1. Sivanandam S N, Sumathi S, Deepa S N," Introduction to Neural Networks using Mat lab 6.0," Tata McGraw Hill Publications, New Delhi, 2006.
2. Timothy Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill, Singapore, 2002.

REFERENCES:

1. John Yen and Rezalangari, "Fuzzy Logic, Intelligence, Control and Information ", Pearson Education, New Delhi, 2007.
2. Mohammad H Hassoun, "Fundamentals of Neural Networks", Prentice hall of India, New Delhi, 2002.