

# ARTIFICIAL NEURAL NETWORK

## Unit 1

ANN Definition, Taxonomy of neural net classifiers for fixed patterns, Mc-Culloch & Pitts Model, structure and working of human brain & comparison with basic ANN model, single layer network. Perceptron training algorithm, linear separability, Hebb's learning rule, Widrow & Holf's learning rule / Delta rule, ADALINE, MADALINE, Comparison of ANN with human brain and AI characteristics and application of ANN.

## Unit II

Multilayer perception, problem with linear activation function, different activation functions like sigmoidal/squashing function, linear threshold function, hyperbolic tangent and Gaussian function. Rumelhart's error back propagation algorithm (EBPA) with proof, momentum, limitations, characteristics and Application of EBPA, case study : NETTALK, two dimensional pattern recognition etc.

## Unit III

Fast training of MLP : EBP using direct solution methods (EBPVDS) , DR symmetric Gaussian Elimination Method (DRSGE) , Random MBD ( Minimum Bit distance) Gram- Schmidt methods (RMGS), case study: Function approximations, Pattern recognition and vowel recognition. Counter Propagation Network: Network Structure, functioning in Normal & Training mode, characteristics of CPN.

## Unit IV

Deterministic v/s statistical training, Boltzman training, Cauchy training, Artificial specification methods. Hopfield /recurrent network, configuration, stability constraints, Associative memory characteristics, limitations and applications Hopfield v/s boltzman machine. Competitive learning : concepts, weight change, example 7 characteristics, lateral inhibition : concepts & examples.

## Unit V

Kohonen self-organizing feature map resemblance with human brain, feature map algorithm- how alpha and d changes with time, examples and properties. Adaptive Resonance Theory(ART): Architecture, classification, implementation & training. Optical neural network, Cognitron and Neocognitron.