NEURAL NETWORKS
(ELECTIVE-II)

Course Code: 13IT2115

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Course Educational Objectives:

The main objective of the course is to introduce Neural Network models, synaptic dynamics, ANN for pattern recognition and applications. Upon completion of this course, the student should be able to:

1. Identify the various neural network models and their characteristics.
2. Differentiate feed forward and feedback neural networks and their functionalities.
3. Understand ANN for pattern recognition and applications of ANN.
4. Understand the concept of synaptic dynamics.
5. Understand the competitive learning neural networks

Course Outcomes:

At the end of the course the student will be able to

1. Achieve an understanding of the technical potential and the advantages and limitations of the learning and self organizing systems of today.
2. Apply the methods and produce applications in their working life.
3. Describe the assumptions behind, and the derivations of the ANN algorithms dealt with in the course, it gives example of design and implementation for small problems.
4. Learn Analysis of linear auto associative FF Networks
5. Learn applications of Artificial Neural Networks

UNIT- I

Basics of artificial neural networks: Characteristics of neural networks, Historical development of neural network, artificial neural networks: terminology, models of neurons, topology, basic learning laws.

Activation and synaptic dynamics: Activation Dynamics models, Synaptic Dynamics models, learning methods, stability and convergence, recall in neural networks.

UNIT -II

Functional units of ANN for pattern recognition tasks: Pattern Recognition Problems, basic functional units, Pattern Recognition tasks by the functional units

UNIT -III

Feed forward neural networks: Analysis of pattern association networks, Analysis of pattern classification networks, Analysis of pattern mapping networks.

Feedback neural networks: Analysis of linear auto associative FF Networks, Analysis of pattern storage networks, Stochastic Networks and Simulated Annealing, Boltzmann Machine.

UNIT -IV

Competitive learning neural networks: Components of competitive learning networks, analysis of feedback layer for different output functions, analysis of pattern clustering networks, analysis of feature mapping networks

UNIT- V

Architectures for complex pattern recognition tasks: Associative memory, pattern mapping, stability-plasticity dilemma: ART, Temporal patterns, Pattern Variability: Neocognition

Applications of ANN: Direct Applications, Application Area.

Text books:

1. B. Yegnanarayana, *Artificial Neural Networks*, 1st Edition, Prentice Hall, 2009

References:

1. Satish Kumar, *Neural Networks – A Classroom Approach*, 2nd Edition, Tata McGraw-Hill, 2004.
2. C.M.Bishop, *Pattern Recognition and Machine Learning*, 1st Edition, Springer, 2006.

Web reference :

www.nd.com/nnreference.html