

## **Neural Network using MATLAB for Engineering and Medical Care**

### **1. Introduction**

- Biological Neuron
- Dendrites
- Axon
- Synapse

### **2. Introduction Neural Network**

- BASIC introduction Neuron
- Activation function
- The Neuron Diagram
- Neuron Models
- step function
- ramp function
- sigmoid function
- Gaussian function

### **3. Network Architectures**

- single-layer feed-forward
- multi-layer feed-forward
- recurrent

### **4. Neural Network Learning Rules**

- Supervised and Unsupervised Learning
- Hebbian Learning Rule
- Perceptron Learning Rule
- Delta Learning Rule
- Winner Take All Learning Rule

### **5. FUZZY LOGIC**

- Definition of fuzzy



- FUZZY LOGIC REPRESENTATION
- FUZZY LOGIC Example

### **Introduction of Matlab**

- About MATLAB.
- MATLAB Screen
- Variable , array , Matrix , Indexing
- Operators (Arithmetic, relational, Logical).
- Display Facilities
- Flow Control (IF, Switch, For, While, Break).
- Command line
- M-File
- Mat-file.
- Scripts and Functions.
- Data storage.
- Input/output capability.

### **Working On MATLAB Environment**

- How to open, quit and work on command window.
- Introduction of MATLAB Screen.
- Command Window.
- Current Directory.
- Workspace.
- Command history.
- Introduction of useful command.

### **Getting Started with Neural Network Toolbox**

- Classify Patterns with a Neural Network
- Neural Network Pattern Recognition Tool.



- Neural Network Fitting Tool.
- Network Time Series Tool.
- Parallel Computing on CPUs and GPUs

#### **Neural Networks: MATLAB examples**

1. Calculate the output of a simple neuron
2. Classification of linearly separable data with a perceptron
3. Classification of a 4-class problem with a 2-neuron perceptron
4. ADALINE time series prediction with adaptive linear filter
5. Classification of an XOR problem with a multilayer perceptron
6. Classification of a 4-class problem with a multilayer perceptron
7. Radial basis function networks for classification of XOR problem
8. 1D and 2D Self Organized Map
- 9. Face Recognition Using Artificial Neural Network (for CSE)**
- 10. Hand Written Character Recognition Using Neural Networks (FOR CSE)**
- 11. Obstacle Avoidance in Mobile Robot using Neural Network**
- 12. NEURAL NETWORK CONTROLLER FOR DC MOTOR**

