



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

(Autonomous Institute Affiliated to University of Mumbai)

| Course Code | Course Name | Teaching Scheme (Hrs/week) | | | Credits Assigned | | | | |
|-------------|--------------------------------|----------------------------|----|-----------|------------------|-------|----|-------|-------|
| | | L | T | P | L | T | P | Total | |
| CPEL7025 | Elective-II Soft Computing Lab | -- | -- | 2 | -- | -- | 1 | 1 | |
| | | Examination Scheme | | | | | | | Total |
| | | ISE | | ESE | | Total | | | |
| | | | | Practical | Oral | | | | |
| | | 40 | - | | 20 | | 60 | | |

| | |
|-----------------------------------|-------------------------|
| Pre-requisite Course Codes | CPE7025(Soft Computing) |
|-----------------------------------|-------------------------|

At end of successful completion of this course, student will be able to

| Course Outcomes | CO1 | Differentiate various Transfer Functions. |
|-----------------|-----|---|
| | CO2 | Apply the supervised and unsupervised learning algorithm. |
| | CO3 | Apply & design fuzzy controller system. |
| | CO4 | Apply Genetic algorithm for basic optimization problem. |

| Exp. No. | Experiment Details | Ref. | Marks | | | | | | | | |
|----------------|---|---------------------------|------------------|-----------|--------------|---|---------------------------|---|-------------------------|--|--|
| 1 | To implement Mc-Culloch Pitts Model. | 1-5 | 5 | | | | | | | | |
| 2 | To implement Transfer/Activation Functions. i) A symmetric hard limit transfer function. ii) A Binary step activation function. iii) A Bipolar step activation function. iv) A saturating linear transfer function. v) A hyperbolic tangent sigmoid (tansig) transfer function. vi) A log-sigmoid transfer function | 1-5 | 5 | | | | | | | | |
| 3 | To implement Basic Neural Network learning rules. PROBLEM TO DISTINGUISH BETWEEN APPLES AND ORANGES A produce dealer has a warehouse that store a variety of fruits & vegetables. When fruit is brought to the warehouse , a various types of fruits may be mixed together. The dealer wants a machine that will sort the fruit according to type . There is a conveyer belt on which the fruit is loaded .This conveyer passes through a set of sensors, which measure three properties of fruits :shape , texture and weight. Bias= < Any Value> | 1-5 | 5 | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Type of sensor</th> <th>Output of sensor</th> <th>Condition</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Shape sensor</td> <td>1</td> <td>if fruit is approx. round</td> </tr> <tr> <td>0</td> <td>if fruit is elliptical.</td> </tr> </tbody> </table> | Type of sensor | Output of sensor | Condition | Shape sensor | 1 | if fruit is approx. round | 0 | if fruit is elliptical. | | |
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| | | | | | | |
|----------|--|---|----------------------|--------------------|-----------|--|
| | Texture Sensor | 1 | If surface is smooth | | | |
| | | 0 | If surface is rough | | | |
| | Fruit sensor | 1 | Apple | | | |
| | | 0 | Orange | | | |
| | A) Design a perceptron to recognize these patterns using Joone Editor. B) Write a C++/JAVA/Python program to design a perceptron to recognize these patterns. | | | | | |
| 4 | To implement Hebbian Learning algorithm. | | | 1-5 | 5 | |
| 5 | To implement Multi layer Perceptron Learning algorithm. | | | 1-5 | 5 | |
| 6 | To implement Fuzzy Sets and Fuzzy Relations | | | 1-5 | 5 | |
| 7 | To implement Fuzzy Controllers | | | 1-5 | 5 | |
| 8 | To implement a simple application using Genetic Algorithm. | | | 1-5 | 5 | |
| | | | | Total Marks | 40 | |

References:

- [1] Samir Roy and Chakraborty, "Introduction to soft computing", Pearson Edition.
- [2] S.N.Sivanandam, S.N.Deepa "Principles of Soft Computing" Second Edition, Wiley Publication.
- [3] S.Rajasekaran and G.A.VijayalakshmiPai "Neural Networks, Fuzzy Logic and Genetic Algorithms" PHI Learning.
- [4] Satish Kumar "Neural Networks A Classroom Approach" Tata McGrawHill.
- [5] Hagan, Demuth, Beale, "Neural Network Design" CENGAGE Learning, India Edition.