JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS-2022

B.Tech-VII Semester (ECE)

COURSE CODE (CREDITS): 18B1WEC847 (3) MAX. MARKS: 35

COURSE NAME: Medical Image Processing

COURSE INSTRUCTOR: Dr. Shruti Jain MAX. TIME: 2 Hours

*Note: All questions are compulsory.*

**Q1.** (1 × 5 = 5) [CO3, CO4]

a) What's the difference between edge detection and line detection? Which one is preferred in certain situations?
b) What happens if you apply multiple transforms to an image?
c) In SVM, the dimension of the hyperplane depends upon which one? the number of features or the number of samples
d) In SVM, what is a hyperplane? Features or data points
e) Which Boolean operations on two variables can be represented by a single perceptron layer ? AND or XOR

**Q2** a) Why is back propagation learning also called generalized delta rule ?

b) Abhi wants to evaluate the Young's Modulus of a problem shown in Fig 1. Help in writing the equation.

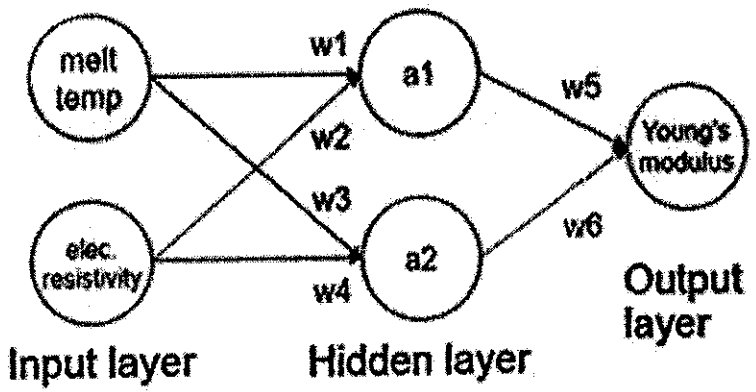


Fig 1

(2 × 2. 5 = 5) [CO3, CO4]

**Q3** a) Ram is saying that "Functions of Image processing and Image analysis may overlap each other". Is he correct? Justify.

b) "Medical imaging allows to investigate the internal body structure which couldn't seen easily as covered by the skin and bones, also to diagnose and treat the disease these imaging technique maintain a database of normal anatomy and identify abnormalities". Justify.

(2 × 2. 5 = 5) [CO2, CO3]

**Q4** a) The distance of the vectors from the hyperplane is called the margin which is a separation of a line to the closest class points. We would like to choose a hyperplane that maximizes the margin between classes. Which options are true for the margin (Hard or Soft)? Elaborate

b) Sambhav is not able to get the concept of Maximum margin Hyperplane. Explain him with figures and examples. (2 × 2. 5 = 5) [CO3, CO4]

**Q5** Why is zero initialization of weight, not a good initialization technique? Suppose we have a perceptron having weights corresponding to the three inputs have the following values: $w_1 = 2$ ; $w_2 = -4$; and $w_3 = 1$ and the activation of the unit is given by the step-function. Calculate the output value $y$ of the given perceptron for each of the following input patterns:

| Pattern | $P_1$ | $P_2$ | $P_3$ | $P_4$ |
|---|---|---|---|---|
| $X_1$ | 1 | 0 | 1 | 1 |
| $X_2$ | 0 | 1 | 0 | 1 |
| $X_3$ | 0 | 1 | 1 | 1 |

(5) [CO3, CO4]

**Q6** Write down the working principle of median filter. Which one is better–median or average filter and why ? Discuss about Prewitt and Sobel operator for detecting edge present in an image. Give a brief overview of Laplacian operator. (5) [CO2, CO3]

**Q7** a) Why is zero initialization of weight, not a good initialization technique?

b) Explain Medical Imaging Modality used for Brain Analysis. (2 × 2. 5 = 5) [CO3, CO4]