PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
MID TERM EXAMINATION - OCT 2023

Semester : Semester VII - 2020   **Date :** 30-OCT-2023
Course Code : ECE3031   **Time :** 11:30AM - 1:00PM
Course Name : Sem VII - ECE3031 - Applications of Deep Learning   **Max Marks :** 60
Program : B. TECH   **Weightage :** 30%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS   **(5 X 2 = 10M)**

1. The development of neural network is motivated by biological neuron structure in human body. What is the need of neural networks in data/ image processing applications when there are plenty of other algorithms available for such operations?

                                                                        (CO1) [Knowledge]

2. Deep Learning has several advantages over machine learning algorithms due to their network architecture. Diiferentiate between deep learning and machine learning. (Any four points)

                                                                        (CO2) [Knowledge]

3. Simple perceptron is a linear classifier which can perform binary classificaton operations. With the help of appropriate digram, explain the Ex-OR problem in perceptron.

                                                                        (CO1) [Knowledge]

4. Multiple filters or kernels are used in convolutional layer of CNN.for image processing. Elaborate the role of filters/ kernels in CNN operation.

                                                                        (CO2) [Knowledge]

5. Activation function is key element in CNN architecture. There are many activation functions such as Sigmoid, RELU, Tanh available for neural network operations. What is the need of activation function in CNN?.

   (CO1) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS   **(3 X 10 = 30M)**

6. a] Introduction of non-linearity in the data computation of ANN and CNN network is a key step in improvement of performance. Explain the necessity of non-linearity in network operation. [5M]

   b] The feature extraction from the input image is a key step in trainng CNN for image prcessing applications. Comment on the role of filters in CNN operations. [5M}

                                                                        (CO1) [Comprehension]

7. Neural networks are used to predict the output based on inout data. The prediction process involves two key steps namely forward and backward propagation. Compute the output prediction of the network given network using the following values (Use Sigmoid activation function)
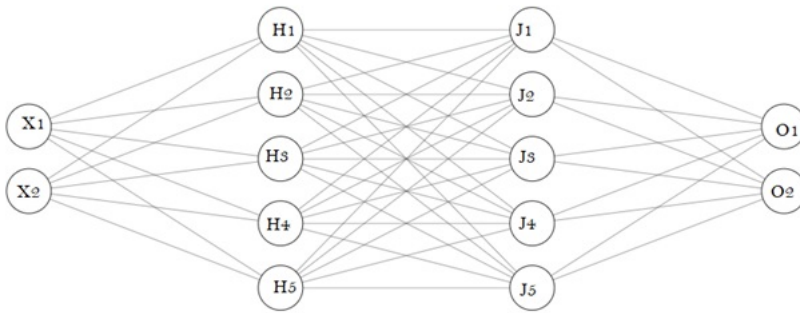
W11=0.2	W12=0.25	W13=0.32	W14=0.43
W15=0.13	W21=0.12	W22=0.35	W23=0.19
W24=0.11	W25=0.33		
WH11=0.2	1WH12=0.38	WH13=0.24	WH14=0.22
WH15=0.25	WH21=0.64	WH22=0.71	WH23=0.11
WH24=0.12	WH25=0.42	WH31=0.30	WH32=0.33
WH33=0.40	WH34=0.45	WH41=0.80	WH42=0.41
WH43=0.11	WH44=0.12	WH45=0.21	WH51=0.45
WH52=0.52	WH53=0.32	WH54=0.11	WH55=0.22
WJ11=0.16	WJ12=0.45	WJ21=0.29	WJ22=0.56
WJ31=0.23	WJ32=0.24	WJ41=0.16	WJ42=0.32
B1=1	B2=1	B3=1	X1=0.75
X2=1.5			

(CO2) [Comprehension]

8. a] The R&D team of renowed Cancer research center is developing a CNN based application for prediction of cancer in the input image. Training dataset of two output classes is given. Each class has 1000 images of size 128 x 128 pixels. Specify the size of input and output layer of CNN. Also mention various advantages of CNN over ANN in such applications. [5 Marks]

b] Explain the role of accuracy, positive and negative recall, positive and negative precision, positive and negative F1 score in nueral network operations.[5 Marks]
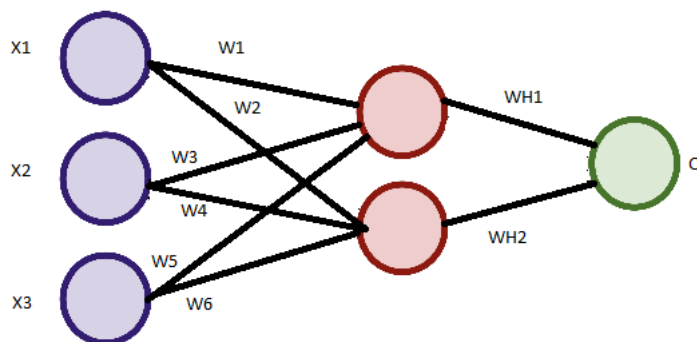
(CO2) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION   **(1 X 20 = 20M)**

9. Backpropagation is a process to reduce the error in nework output. It is done by computing error at every node in the network. Perform the forward propagation and backpropagation output (only one iteration) by using the given data. Use RELU activation function.

W1=0.12	W2=0.16	W3=0.18	W4=0.20
W5=0.25	W6=0.65	WH1=0.34	WH2=0.95
B1=1	B2=1	X1=1	X2=0.5
X3=0.8	T=1.5		

(CO1) [Application]