

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- December 2022

Ph.D. CSE I Semester

COURSE CODE: 18M1WCI332

MAX. MARKS: 25

COURSE NAME: DEEP LEARNING

COURSE CREDITS: 03

MAX. TIME: 1.5Hr

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

1. (a) You have a single hidden-layer neural network for a binary classification task. The input is $X \in \mathbb{R}^{n \times m}$, output $\hat{y} \in \mathbb{R}^{1 \times m}$ and true label $y \in \mathbb{R}^{1 \times m}$. The forward propagation equations are:

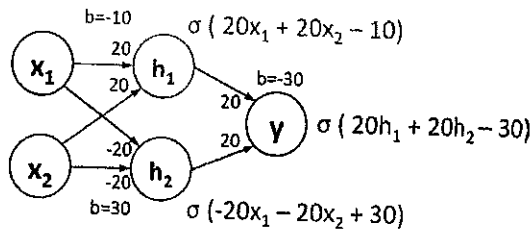
$$\begin{aligned} z^{[1]} &= W^{[1]}X + b^{[1]} \\ a^{[1]} &= \sigma(z^{[1]}) \\ \hat{y} &= a^{[1]} \\ J &= - \sum_{i=1}^m y^{(i)} \log(\hat{y}^{(i)}) + (1 - y^{(i)}) \log(1 - \hat{y}^{(i)}) \end{aligned}$$

Write the expression for $\frac{\partial J}{\partial W^{[1]}}$ as a matrix product of two terms.

CO- 2 [5]

- (b) Solve the XOR with a hidden layer shown Below.

CO- 2 [2.5]



2. (a) Explain how to calculate linear regression using least square method

CO- 2 [5]

$$y = \beta_0 + \beta_1 x$$

x	1	2	3	4	5
y	2	4	5	4	5

- (b) You are designing a deep learning system to detect driver fatigue in cars. It is crucial that that your model detects fatigue, to prevent any accidents. Which of the following is the most appropriate evaluation metric: Accuracy, Precision, Recall, Loss Value. Explain your choice.

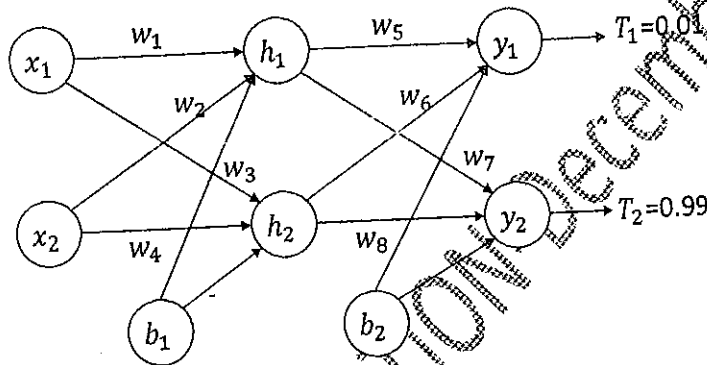
CO- 3 [2.5]

3. Using neural backpropagation Calculate:

- $H_1, H_2, OutH_1, OutH_2$
- $Y_1, Y_2, OutY_1, OutY_2$
- E_{total}
- Updated weights w_5 and w_6

Given:

$w_1 = 0.15$	$w_5 = 0.40$	$x_1 = 0.05$	$\eta = 0.01$ Learning Rate
$w_2 = 0.20$	$w_6 = 0.45$	$x_2 = 0.10$	
$w_3 = 0.25$	$w_7 = 0.50$	$b_1 = 0.35$	
$w_4 = 0.30$	$w_8 = 0.55$	$b_2 = 0.60$	



[10]