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**PRESIDENCY UNIVERSITY
BENGALURU**

G9H'5

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024**

Semester : Semester VII - 2020

Course Code : ECE3031

Course Name : Applications of Deep Learning

Program : B.Tech.

Date : 03-JAN-2024

Time : 9:30AM - 12:30 PM

Max Marks : 100

Weightage : 50%

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.*
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PART A

ANSWER ALL THE QUESTIONS

4 X 5M = 20M

1. Machine learning and deep learning algorithms are extensively used for making predictions in various areas. Differentiate between machine learning and deep learning based on any ten points.
(CO1) [Knowledge]
2. The width and depth of neural network are two important parameters representing network size. Explain the significance of width and depth of neural network and also mention effect of variations in width and depth on network performance.
(CO1) [Knowledge]
3. When the size of neural network increases the performance characteristics of the network also varies. Write brief note on concept of curse of dimensionality which represents effect of size variations of network performance characteristics.
(CO1) [Knowledge]
4. Various activation function such as RELU, sigmoid, step, tanh are used in neural network layers. Explain the role of activation function in neural network design. Also mention advantages of using activation function in neural networks.
(CO1) [Knowledge]

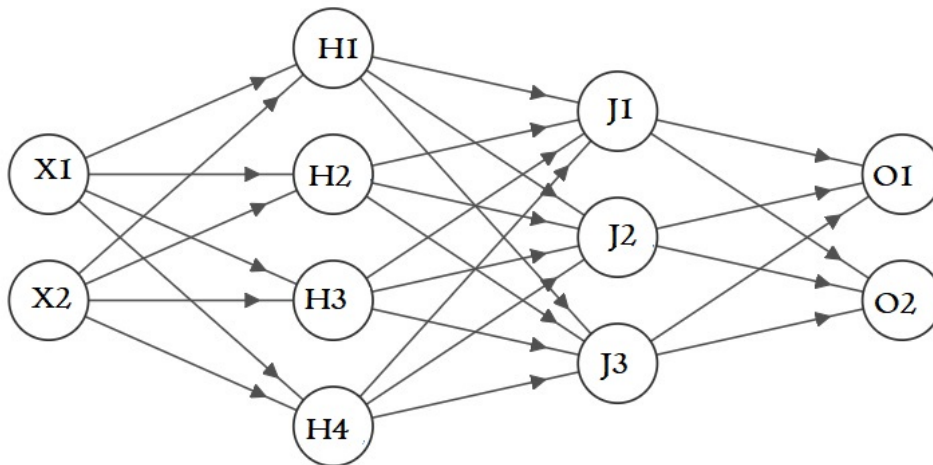
PART B

ANSWER ALL THE QUESTIONS

5 X 10M = 50M

5. The techniques such as data augmentation, dropout and normalization are used to improve the performance of the network. Write a brief note on data augmentation and dropout in neural networks. (CO2) [Comprehension]
6. The non-linearity is an important aspect in neural network design and performance evaluation. Write in brief about need of non-linearity in network and how to introduce non-linearity in the network operation. (CO2) [Comprehension]
7. Forward propagation process helps neural network in making predictions. The weight and bias values are useful in making computations at each layer. Perform one iteration of forward propagation on the following network and compute the output predictions using sigmoid activation function. (Assume necessary values)

$X_1=1$	$X_2=1.2$		
$W_{11}=0.1$	$W_{12}=0.2$	$W_{13}=0.3$	$W_{14}=0.5$
$W_{21}=0.12$	$W_{22}=0.21$	$W_{23}=0.31$	$W_{24}=0.51$
$W_{H11}=0.13$	$W_{H12}=0.22$	$W_{H13}=0.32$	$B_1=1$
$W_{H21}=0.14$	$W_{H22}=0.23$	$W_{H23}=0.33$	$B_2=0.5$
$W_{H31}=0.15$	$W_{H32}=0.24$	$W_{H33}=0.34$	$B_3=1$
$W_{H41}=0.16$	$W_{H42}=0.25$	$W_{H43}=0.35$	
$W_{J11}=0.17$	$W_{J12}=0.26$	$W_{J21}=0.36$	$W_{J22}=0.40$
$W_{J31}=0.18$	$W_{J32}=0.27$		



8. A reputed car manufacturing company is developing Automatic Driver Assistance System (ADAS) which can understand the road situation based images provided by car dashboard camera. They are planning to use CNN based application to classify the images into various categories such as pedestrian, no pedestrian, traffic signal and many more. As a CNN application developer, write in brief about the network design, training, validation and testing. Also mention about performance evaluation and techniques to improve the performance in case of error rate is high. (CO3) [Comprehension]
9. There are various versions of CNNs available in the market for research and commercial purposes. AlexNet, GoleNet, VGG and ResNet are few examples of them. Compare all of them with respect to any ten points. (CO3) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

2 X 15M = 30M

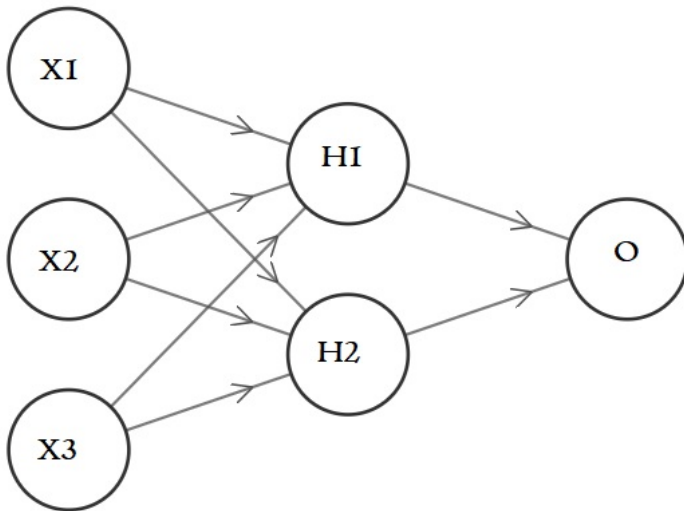
10. The R&D team of reputed agricultural reserach institute has developed a CNN based application to indentify plant leaf disease. They have trained the CNN for four output classes with 1000 images of each class. After successful training, the CNN is tested using 100 images of each class. The confusion matrix of the test output is shoem below.

		Predicted Values			
		Class 1	Class 2	Class 3	Class 4
Actual Values	Class 1	63	12	07	18
	Class 2	90	00	02	08
	Class 3	75	23	02	00
	Class 4	82	03	12	03

Compute the classwise performance metrices and comment on the network performance in brief.

(CO4) [Application]

11. Neural networks perform the backpropagation process to reduce the error between expected and target value. Iterate the given neural network using sigmoid activation function for one iteration in forward and backward propagation to show error corrction capabilities. Use the given network and values for this process. (Assume necessary values)



X1=1	X2=1.5	X3=2
W11=0.75	W12=0.25	WH1=0.35
W21=0.21	W22=0.26	WH2=0.34
W31=0.57	W32=0.46	B1=1
B2=1	T=1	L.R.(α)=0.1

(CO4) [Application]