Total number of printed pages: **Programme(UG)/7th Semester/UCSE713**

2023

Deep learning & Neural network

Full Marks: 100

Time: Three hours

Answer any Five questions.

1. i. What is the need of activation function? Explain the various types of activation functions in details. Write advantages and disadvantages of each of these. 2+4+4=10

   ii. Explain Vanishing Gradient Problem and Exploding Gradient problem. What are the solution to these. 5

   iii. What is the "dying ReLU" problem in neural networks? What are the solution to these. 5

2. i. Train a heteroassociative network to store the given bipolar input vector **s = (s1, s2, s3, s4)** to the output vector **t = (t1, t2).** Also perform the test for the given network with missing and mistaken data in test vector. 10

s_1	s_2	s_3	s_4	t_1	t_2
1	-1	-1	-1	-1	1
1	1	-1	-1	-1	1
-1	-1	-1	1	1	-1
-1	-1	1	1	1	-1

   ii. a. What do you mean by Associative Memory? How does it work? 5+5=10
   b. Explain the various types of associative memory.

3 i. Draw the neural network architecture and calculate the output of the network with following inputs and weights values using the activation functions 4+6=10

   i. Binary Sigmoid

   ii. Bipolar Sigmoid

   iii. ReLU

[x1, x2, x3, x4]=[0.2, 0.6, 0.4, 0.5] and

[w1, w2, w3, w4]= [0.11, 0.5, -0.2, 0.3] with bias b =1.

ii. Explain Back propagation in details with the help of a diagram. Why We Need Back propagation? 10

4. i. a. What do you mean by LSTM? 2+3+5+4=14

b. How it is differ from RNN?

c. Explain the structure of LSTM with the help of a diagram.

d. What are the advantages and disadvantages of LSTM?

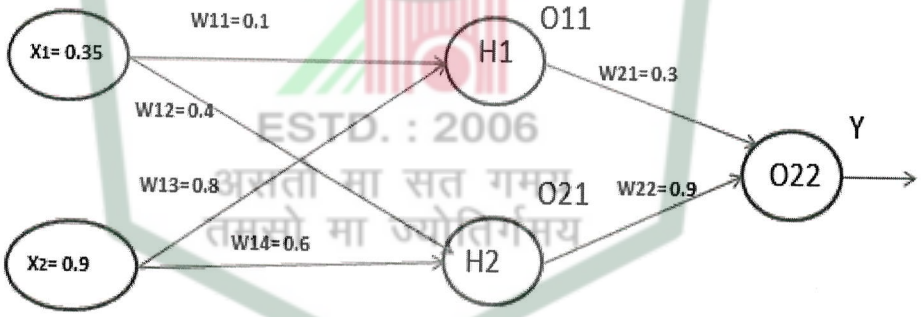
ii. What are the feed forward and feed backward network, explain with the help of diagram. 6

5. i. Define ANN. Describe in details the various models of ANN. Explain structure of biological neurons in details. 2+5+3=10

ii. a. What are the applications of deep learning in real life? 5+5=10

b. Explain CNN in details.

6. Assume that the neurons have a sigmoid activation function, perform a forward pass and a backward pass on the network. Assume that the target output y is 0.5 and learning rate is 1. Perform back propagation only once 20



7. Write short note on 4*5=20

i. Drop out layers

ii. Shallow and Deep NN

iii. Machine learning and deep learning

iv. Chain rule of differentiation

v. Supervised learning and unsupervised learning.

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