
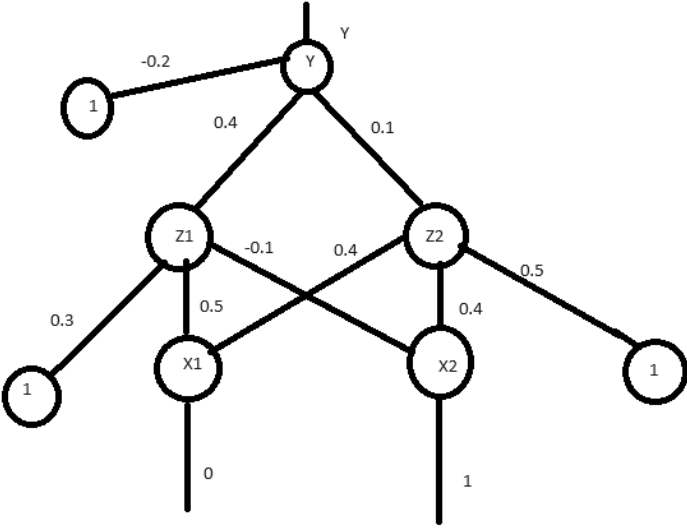


Name:			
Enrolment No:			
<b>UPES</b> <b>End Semester Examination, December 2023</b>			
<b>Course: Neural Networks</b> <b>Semester: V</b> <b>Program: B. Tech CSE – AI (H+NH)</b> <b>Course Code: CSAI 3001</b>		<b>Time: 03 hrs.</b> <b>Max. Marks: 100</b>	
<b>Instructions: All Questions are compulsory. Internal Choice is mentioned in the paper</b>			
<b>SECTION A</b> <b>(5Qx4M=20Marks)</b>			
S. No.		Marks	CO
Q 1	Define cross-validation technique? Illustrate early stopping of training based on the cross-validation	4 marks	CO2
Q 2	Implement AND Function using MP Neuron.	4 marks	CO1
Q 3	Illustrate the influence of a linear equation over the net input calculation.	4 marks	CO2
Q 4	(a) Explain the building block of perceptron network. (b) Describe Gradient descent method	4 marks	CO3
Q 5	(i) Explain the following instruction: (a) super (CNN,self)._init_() (b) optimizer.zero_grad() (ii) Explain pooling.	4 marks	CO1
<b>SECTION B</b> <b>(4Qx10M= 40 Marks)</b>			
Q 6	Draw and Explain the LSTM cell structure. Write the formulas describing the operations of the LSTM	10 marks	CO5
Q 7	(a) If 18 filters are applied to the image in the first convolution layer, how many resulting feature maps would you have? (b) If 18 filters are applied to the image at the first convolution layer, what is the depth of each layer. (c) Consider a CNN with 5 layers, at the 4 <sup>th</sup> layer, the depth of the feature maps is 512. You wish to generate 1024 feature maps at the 5 <sup>th</sup> layer. How many filters should you apply, and what is the depth of each filter. (d) Explain the CNN characteristics. (4 marks)	10 marks	CO5
Q 8	Explain the following: (a) L1 and L2 Regularization (b) Dropblock (c) Batch and Group Normalization.	10 marks	CO4

Q 9	Explain backpropagation through time algorithm with the explanation of computation graphs of both forward and backward (including gradient calculations). Assume timestep of 3.	10 marks	CO4
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**SECTION-C**  
**(2Qx20M=40 Marks)**

Q 10	<p>Using backpropagation_ network, find the new weights the shown in Figure. It is presented with the input pattern [0, 1] and the target output is 1. Use a learning rate <math>\alpha = 0.25</math> and binary sigmoidal activation function. [epoch 2]</p> 	20 marks	CO2
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Q 11	<p>(A) RNNs can be used in four configurations 1 to 1 , 1 to many , many to 1 and many to many. Identify which type of RNN will you apply for the following:</p> <ul style="list-style-type: none"> <li>(a) Named entity recognition: For each word in a sentence classify that word as either a person, organization, location, or none.</li> <li>(b) Sentiment analysis: Classify the sentiment of a sentence ranging from negative to positive (integer values from zero to four)</li> <li>(c) Language models: Generating text from a chatbot that was trained to speak like you by predicting the next word in the sequence.</li> <li>(d) Image tagging: Automatic generation of tags from a photo</li> </ul>		CO4 and CO3
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(B) Define a vanilla RNN. What are the two main issues that could occur while training a RNN.  
(C) . Draw the architecture of bidirectional RNN and explain with an example how it can perform better than a single RNN network.

OR

Write Short Notes on:

- (a) Feed-Forward Neural Networks
- (b) Network Pruning Techniques
- (c) Unconstrained Optimization Techniques
- (d) Statistical Nature of the Learning Process

**20 marks**