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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 5027

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE / JULY 2024
Second Semester
Computer Science and Engineering
P23CSE16 – DEEP LEARNING TECHNIQUES
(Regulation 2023)

Time: Three Hours   Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	After training a neural network, you observe a large gap between the training accuracy (100%) and the test accuracy (42%). Which methods are commonly used to reduce this?	2	K3	CO1
2.	When should multi-task learning be used?	2	K1	CO1
3.	What is Error Analysis?	2	K1	CO2
4.	How does splitting a dataset into train, dev and test sets help identify overfitting?	2	K2	CO2
5.	You are designing a deep learning system to detect driver fatigue in cars. It is crucial 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.	2	K4	CO3
6.	You want to solve a classification task. You first train your network on 20 samples. Training converges, but the training loss is very high. You then decide to train this network on 10,000 examples. Is your approach to fixing the problem correct? If yes, explain the most likely results of training with 10,000 examples. If not, give a solution to this problem.	2	K4	CO3
7.	How pooling handles inputs of varying size?	2	K3	CO4

8.	How to reduce the cost of convolutional network training?	2 K2 CO4

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9. You are given a content image X_C and a style image, X_S. You would like to apply neural style transfer to obtain an output image Y, with the content of X_C and the style of X_S, as discussed in section. You are told that you need a pretrained VGG-16 network to do this. What is the function of this pretrained network? 2 K3 CO5

10. Suppose 10000 patients get tested for flu; out of them, 9000 are actually healthy and 1000 are actually sick. For the sick people, a test was positive for 620 and negative for 380. For healthy people, the same test was positive for 180 and negative for 8820. Construct a confusion matrix for the data and compute the accuracy, precision and recall for the data. 2 K3 CO5

PART – B

(5 x 13 = 65 Marks)

| Q.No.	Questions	Marks	KL	CO
11. a)	List and explain the various activation functions used in modeling of artificial neuron. Also, explain their suitability with respect to applications.	13	K2	CO1
	(OR)			
b)	Is deep belief network an RNN? Illustrate the layers of deep belief network.	13	K1	CO1
12. a)	After visually inspecting the dataset, you realize that the training set only contains pictures taken during the day, whereas the dev set only has pictures taken at night. Explain the issue and how you would correct it.	13	K3	CO2
	(OR)			
b)	Explain Random forest algorithm. Give its benefits.	13	K1	CO2
13. a)	Calculate the output of the following neuron Y with the activation function as a) binary sigmoid b) tanh c)ReLU	13 (5,4,4)	K3	CO3
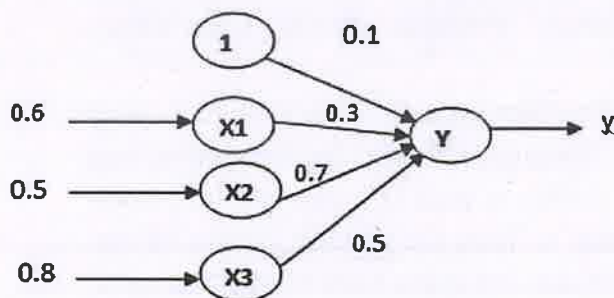
(OR)

b)	Explain the CART Algorithm for Decision Trees. Differentiate it with other Decision tree algorithms.	13	K2	CO3

14.	a)	Illustrate the operation of pooling layer in CNN with simple example.	13	K1	CO4
		(OR)			
	b)	Differentiate gradient descent with and without momentum. Give equations for weight updation in GD with and without momentum. Illustrate plateaus, saddle points and slowly varying gradients.	13	K3	CO4
15.	a)	Suppose a supervised learning problem is given to model a deep feed forward neural network. Suggest solutions for the following a) small sized dataset for training b) dataset with both labelled and unlabeled data c)large data set but data from different distribution	13 (5,5,3)	K4	CO5
		(OR)			
	b)	Suppose that a CNN was trained to classify images into different categories. It performed well on a validation set that was taken from the same source as the training set but not on a testing set. What could be the problem with the training of such a CNN? How will you ascertain the problem? How can those problems be solved?	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)	i.	Update the parameters in the given MLP using back propagation with learning rate as 0.5 and activation function as sigmoid. Initial weights are given as W1= 0.2, W2 = 0.1, W3 = 0.1, W4 = 0.3, W5 = 0.2, W6 = 0.5, and biases as B1 = - 1, B2 =.3, Bout =.7. The target output = 1.	11	K4	CO3
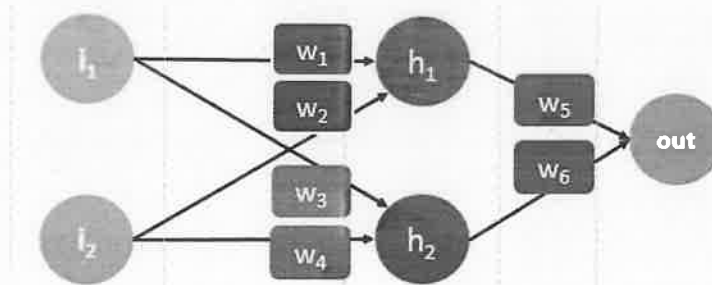
| | | ii. | Explain the importance of choosing the right step size in neural networks. | 4 | K3 | CO3 |
| | | | (OR) | | | |

b)	i.	Prove that the decision boundary of binary logistic regression is linear.	9	K3	CO2
	ii.	Given the following data, construct the ROC curve of the data. Compute the AUC.	6	K3	CO2

Threshold	TP	TN	FP	FN
1	0	25	0	29
2	7	25	0	22
3	18	24	1	11
4	26	20	5	3
5	29	11	14	0