U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January 2024 Semester End Main Examinations

Programme: B.E. **Semester: VII**
Branch: ES – Cluster Elective **Duration: 3 hrs.**
Course Code: 19EC7CE2DL **Max Marks: 100**
Course: Deep Learning

Instructions:1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Define deep learning and differentiate between supervised and unsupervised machine learning.	*CO 2*	*PO2*	**6**
	b)	Interpret with example following linear algebra objects used in machine learning i)Vectors ii)Matrices iii)Tensors iv)Hyper planes	*CO 2*	*PO 2*	**8**
	c)	Compare the features of partition based and hierarchical clustering algorithms.	*CO 2*	*PO 2*	**6**
		UNIT - II			
2	a)	Considering a simple Neural Network of one input node, two hidden nodes and one output node with weights initialized as: W_{111}= 0.4, W_{121}= -0.3, W_{211}= -0.23 , W_{212}= 0.5 and b_1=b_2 =b_3=1. Input 'X'= 2 and output 'y' = 5. Applying sigmoid activation and 'mse' as the loss function, update W_{111} using gradient descent.	*CO 1*	*PO 1*	**8**
	b)	Briefly discuss with illustration, Sigmoid, ReLu and Softmax activation functions in terms of their usability.	*CO 2*	*PO 2*	**6**
	c)	Compare 'He' and 'Xavier' kernel initializers.	*CO 2*	*PO 2*	**6**
		OR			
3	a)	With neat diagram, briefly explain the structural design of a multilayer perceptron. Design a Boolean Ex-OR logic using an appropriate MLP model.	*CO 2*	*PO 2*	**10**
	b)	Given in the table, the scores for three classes at the output layer of a classifier. Apply the appropriate activation function and calculate the cross entropy loss. The actual output is given as: [1,0,0]. .	*CO 1*	*PO 1*	**10**

Class	Score
1	1.26
2	-3.22
3	0.85

			UNIT - III			
	4	a)	Write a python program using Keras APIs to develop a multiclass classifier using FCN. The network has 2 dense layers having 16 neurons each and an output layer. The dataset has 8 features and a target column having 3 different classes. Use the hyperparameters appropriately.	***CO 3***	***PO 3***	**10**
		b)	Analyze the SGD with momentum optimizer and justify it handles the local minima.	***CO 2***	***PO 2***	**10**
			UNIT - IV			
	5	a)	Analyze the feature learning process in a convolutional neural network. Compare the features of convolutional layer with those of fully connected layer.	***CO 2***	***PO 2***	**8**
		b)	Write the Keras APIs for: Conv2D(), Dense(), compile() and predict() for classifier models.	***CO 3***	***PO 3***	**8**
		c)	Briefly discuss on the possibility of transfer learning partially or completely.	***CO 2***	***PO 2***	**4**
			OR			
	6	a)	Design the deep neural network with VGG16 Architecture and calculate the total number of weights being trained in all the convolutional layers. Identify it's major contributions.	***CO 3***	***PO 3***	**10**
		b)	Considering a 9x9 input image matrix and 3x3 Kernel, illustrate the operation of Convolution with stride=1 and 2. Discuss the concept of padding and dilation.	***CO 2***	***PO 2***	**10**
			UNIT - V			
	7	a)	Illustrate one Recurrent Neural Network cell and identify the reason for its vanishing or exploding gradient.	***CO 2***	***PO 2***	**10**
		b)	With the design, briefly discuss on LSTM architecture.	***CO 2***	***PO 2***	**10**

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