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Third Semester M.Tech. Degree Examination, Jan./Feb. 2023 Deep Learning

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Learning. Name any five learning tasks. Explain linear regression in detail. (10 Marks)
b. Explain the forms capacity, regularization and hyper parameters in a learning model. (10 Marks)

OR

- 2 a. Define supervised and unsupervised algorithms. Describe KNN and K-means algorithms. (10 Marks)
b. Describe essentials components in building ML algorithm. What are the challenges that motivate Deep Learning? (10 Marks)

Module-2

- 3 a. Given $W = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$, $C = \begin{bmatrix} 0 \\ -1 \end{bmatrix}$, $W = \begin{bmatrix} 1 \\ -2 \end{bmatrix}$ and $b = 0$ draw feed forward network and evaluate XOR function. (10 Marks)
b. Explain universal approximation theorem. Describe RLU hidden unit and sigmoid output unit. (10 Marks)

OR

- 4 a. Explain computational graph. Describe the steps to train neural network with back propagation. (10 Marks)
b. Define regularization. Describe L_2 and L_1 parameter regularization. (10 Marks)

Module-3

- 5 a. Define optimization. Describe batch and mini batch algorithms. List the optimization challenges. (10 Marks)
b. Describe stochastic gradient descent and momentum algorithms. What are the challenges in neural network optimization? (10 Marks)

OR

- 6 a. Give a list of adaptive learning rates algorithms. Write the Ada Grad algorithm. (10 Marks)
b. Describe convolution operation. How that can improve machine learning system? With diagram show the components of convolutional network layer. (10 Marks)

Module-4

- 7 a. Explain Recurrent Neural Network (RNN). Illustrate unfolding of computational graphs. How is RNN different from CNN? (10 Marks)
- b. Describe encoder-decoder sequence-to-sequence architectures. (10 Marks)

OR

- 8 a. Discuss the architecture of Long Short Term Memory (LSTM). (10 Marks)
- b. Write a note on : (i) Optimization in RNN (ii) Explicit memory. (10 Marks)

Module-5

- 9 a. Write the practical design steps of deep learning. Describe performance metrics. (10 Marks)
- b. Describe the recommendations for baseline models. (10 Marks)

OR

- 10 a. Discuss the criteria for gathering training data and hyperparameters. Also a note on debugging strategy. (10 Marks)
- b. Briefly describe the processing steps in computer vision and NLP applications. (10 Marks)
