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

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: VI**
Branch: Artificial Intelligence And Machine Learning **Duration: 3 hrs.**
Course Code: 22AM6PCDEL **Max Marks: 100**
Course: Deep Learning **Date: 14.09.2023**

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

UNIT - I

1 a) Differentiate between L^1 and L^2 regularizations in detail. In which scenarios are these regularizations best suited? **10**

b) Design a Neural Network Model to solve the following Truth Table with a sigmoidal activation function: **05**

X1	X2	Y
0	0	0
0	1	1
1	0	1
1	1	0

c) Justify why the Softmax units are best suitable for a Multinoulli Output Distribution environment. **05**

OR

2 a) With suitable algorithmic steps, illustrate the forward propagation and backward computation algorithms of a Deep Neural Network in detail. **10**

b) Is Dropout a computationally inexpensive and yet a powerful method for regularization? Explain. **10**

UNIT - II

3 a) Elaborate on the possible challenges that could be faced while training a Recurrent Neural Network(RNN). **10**

b) For training a sequence prediction task using RNN, given a training dataset with 1000 sequences, each consisting of 20-time steps and 5 features, with a mini-batch size of 32, how many iterations would be required to complete one epoch of training? Construct the relevant architectural block and conclude the solution accordingly. **10**

UNIT – III

4 a) Elaborate on the concepts of activation layer and pooling of a Convolutional Neural Network (CNN) along with suitable numerical examples. **12**

b) Design a CNN model with the following layers and determine the number of parameters in it: **08**
Input: Grayscale images of size 128x128 pixels
Convolutional layer 1: 32 filters of size 3x3, stride 1, and padding of 1
Convolutional layer 2: 64 filters of size 3x3, stride 1, and padding of 1
Convolutional layer 3: 128 filters of size 3x3, stride 1, and padding of 1
Global average pooling layer: Pool over the spatial dimensions
Fully connected layer 1: 256 neurons
Output layer: Number of medical conditions/classes

UNIT - IV

5 a) Illustrate the application of Greedy layer-wise unsupervised pertaining protocol in a representation learning environment along with its algorithm. **10**

b) Prove that the Transfer Learning between 2 domains enable Zero-Shot learning along with necessary mathematical models and diagrammatic representations. **10**

UNIT - V

6 a) Explain the Differentiable Generator Networks by deriving necessary mathematical relations. **10**

b) Derive the conditional distribution property of a Restricted Boltzmann Machine (RBM) and elaborate the procedure briefly. **10**

OR

7 a) Using process graphs, explain the Marcov chain process model that is related with a trained denoising Autoencoder which will be used for generating samples from the probabilistic models. **10**

b) How does the concept of Boltzmann machine support multi-prediction? Elaborate on the process of training such models with necessary relations and block diagrams. **10**

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