Sr. No. 016704

December 2023

B.Tech (CE(DS)) 7th Sem

Deep Learning and Image Processing (PCC-DS-703)

Time: 3 Hours

Max. Marks:75

Instructions:

1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.

2. Answer any four questions from Part -B in detail.

3. Different sub-parts of a question are to be attempted adjacent to each other.

PART -A

Q1 (a) Differentiate between Machine Learning and Artificial Intelligence (1.5)

(b) What do we need region descriptors of an image? (1.5)

(c) Draw the signature representation of a square (1.5)

(d) What is co-occurrence matrix? (1.5)

(e) What do you mean by loss function in linear machines? (1.5)

(f) Write the threshold function for the following (1.5)
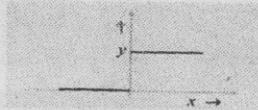
(g) Can we design a Neural Network for non-linear problems ? Justify (1.5)

(h) Compare Autoencoders with PCA (1.5)

(i) What is a feature map? (1.5)

(j) An input image has been converted into a matrix of size 12 X 12 along with a filter of size 3 X 3 with a Stride of 1. Determine the size of the convoluted matrix. (1.5)

Q2 (a) What do you mean by back propagation learning? Derive expressions for weight updation and learning rate in case of single layer and multiple outputs (10)

(b) Explain polygonal boundary representation of a shape with a suitable example. (5)

Q3 (a) Explain the significance of the RELU Activation function (5)

(b) Explain Linear Classifier with 2 Class problem. Derive an expression for weight updation (10)

Q4 What are neural networks? Design a single neuron with threshold non-linearity to implement AND function with two inputs X_1 and X_2 and output y. (15)

Q5 Discuss the basic structure of an autoencoder. Why hidden layer is called a bottleneck layer? "Autoencoders shall be insensitive enough that it does not memorize or overfit the training data". Justify with a suitable example. (15)

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Q6 (a) Explain skip connection in Deep learning (5)

(b) Why do we prefer Convolutional Neural networks (CNN) over Artificial Neural networks (ANN) for image data as input? What are the 4 components of CNN? (10)

Q7 Write short notes on (Any three): (15)
   a) Bayesian Learning
   b) Recurrent Neural Network
   c) Residual Network
   d) Multilayer Perceptron

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