Nirma University
Institute of Technology
B. Tech CSE Sem. VI
2CSDE61 – Deep Learning
Additional Test, May 2021

Total Marks: 35 Time: 75 minutes

Roll No. | Supervisor's initial with date

Instructions:
1. Attempt all questions.
2. Figures to right indicate full marks.
3. Draw neat sketches wherever necessary.
4. Assume suitable data wherever necessary and specify clearly.

Q 1 CO2 Assume a convolutional layer with some input volume (denoted as I, I=$\begin{bmatrix} I11 & I12 & I13 \\ I21 & I22 & I23 \\ I31 & I32 & I33 \end{bmatrix}$) of size 3 x 3. Assume that there is 1 convolutional filter (F = $\begin{bmatrix} F11 & F12 \\ F21 & F22 \end{bmatrix}$) of size 2 x 2, 2P=1 (left-top padding) and stride S=1, producing output volume O = $\begin{bmatrix} O11 & O12 \\ O21 & O22 \end{bmatrix}$ in the forward propagation. During backpropagation, what would be gradients with respect to activations of I? Write equations for these gradients in terms of just the global and local gradients. Please note there would be 9 equations in total which you should state clearly and separately. [9]

Q 2 CO3 Assume a single Inception V1 module (with dimension reduction). Assume the size of the input volume to this module is 28 x 28 x 192 and the module uses 64 number of 1 x 1 convolution, 96 number of 3 x 3 reduce, 128 number of 3 x 3 convolution, 16 number of 5 x 5 reduce, 32 number of 5 x 5 convolution and 32 number of max pool projections. How many connections (or in other words, ops) are involved in this module? Write the exact value as the answer. Ignore bias in calculation. [9]

Q 3 CO2 What are anchor boxes in object detection? How are they useful? [4]

Q 4 CO2 Why does LSTM not suffer from vanishing gradient problem? [3]

Q 5 CO2 In words, state the objective/loss function of generator and discriminator separately. [4]

Q 6 CO1 Differentiate between machine learning and deep learning in brief. [3]

Q 7 CO3	Differentiate between semantic segmentation, instance segmentation and object detection.	[3]