Nirma University
Institute of Technology
B. Tech CSE Sem. VI
2CSDE61 – Deep Learning
Class Test, February 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 CO1 When should one use transfer learning? Explain with a suitable example. [3]

Q 2 CO2 Assume a neural network with a sequence of layers like: Input Layer (I) -> Convolutional Layer (C1) -> Max Pooling Layer (P1) -> Convolutional Layer (C2) -> Fully Connected Layer (F1) -> Fully Connected Layer (F2). Layer I receives and passes grey scale images of size 64 x 64 to C1. C1 employs 4 kernels with F=5, S=1 and P=0. Output of C1 is then fed to P1 which employs F=2, S=2 and P=0. Next, Output of P1 is processed by C2 with 8 kernels having F=5, S=1 and P=0. Output of C2 is further processed by F1 with 40 neurons. Finally, F2 produces probabilities of class using 10 neurons with softmax activations. Calculate total number of parameters and connections in the network. **Show the computation layer wise**. Assume number of channels in kernels in some layer L = number of channels in input of layer L (e.g. in this example C1 employs 4 kernels each having depth=1). Also, separately report number of parameters **layer wise** when convolutional and pooling layers are replaced by fully connected layers. Also, report total number of parameters in both cases. [16]

Q 3 CO2 Consider a following 6 x 6 image and a 3 x 3 convolutional filter. [16]

3	0	1	2	7	4
1	5	8	9	3	1
2	7	2	5	**1**	3
0	**1**	3	1	7	8
4	2	1	6	2	8
2	4	5	2	3	9

6 X 6 image

1	0	-1
1	1	-1
1	0	-1

3 X 3 filter

Compute activations (assume ReLU as the activation function) of each neuron in the feature map resulting from applying the

filter shown in the above image. (referred as fm1, henceforth). Assume bias = 0, no padding and stride = 1. Apply 2 x 2 max-pooling on fm1 and show activations of each neuron in the resultant feature map. Assume stride = 2 and no padding.