Homework-9

Q1:

Consider the following deep learning model, with layers stacked in a sequential order:

layer 0: RGB image of size 200 x 200

layer 1: MaxPooling2D layer with pool size (2, 2)

layer 2: Conv2D layer with 64 filters and kernel size (3, 3). The padding method is “same”

layer 3: MaxPolling2D layer with pool size (2, 2)

layer 4: Flatten layer

layer 5: Dense layer of 10 nodes

layer 6: Dense layer of 4 nodes

layer 7: SoftMax

1. Nonlinear activation (ReLU) should be applied immediately after some of these layers. Mark below the layers that should be followed by ReLU.

Answer:

layer 2, 5, 6 should be followed by ReLU.

(Activation should be used after convolution Layers and dense Layers)

2. Compute the number of trainable weights that are associated with each layer. (These are the weights with values that are determined during the training.) For simplicity assume no bias connections. Show your calculations.

Answer:

layer 0: RGB image of size 200 x 200

200 \* 200 \* 3 \* 1 = 120000

layer 1: MaxPooling2D layer with pool size (2, 2)

cell(200/2) \* cell(200/2) \* 3 \* 1

= 100 \* 100 \* 3 \* 1 = 30000

layer 2: Conv2D layer with 64 filters and kernel size (3, 3). The padding method is “same”

(floor(100/3) \* 3) \* (floor(100/3) \* 3) \* 3 \* 64

= 99 \* 99 \* 3 \* 64 = 1881792

layer 3: MaxPolling2D layer with pool size (2, 2)

cell(99/2) \* cell(99/2) \* 3 \* 64

= 50 \* 50 \*3 \* 64 = 480000

layer 4: Flatten layer

= 50 \* 50 \*3 \* 64 = 480000

layer 5: Dense layer of 10 nodes

50 \* 50 \* 3 \* 10 = 75000

layer 6: Dense layer of 4 nodes

50 \* 50 \* 3 \* 4 = 30000

layer 7: SoftMax

50 \* 50 \* 3 \* 4 = 30000