SUTD 50.039 Theory and Practice of Deep Learning (2025) - HW2, Part 2

Last update: 26-Feb 2025

Answer all questions and assemble your answers in the same report as the one you wrote for part 1.

Question 1

(1) What is the output when we convolve the left image with the 3 × 3 filter on the right (assuming stride = 1 and no padding)?

Image:

1	1	2	0	3
2	4	2	1	1
1	1	5	3	0
1	2	6	0	1
0	1	2	0	3

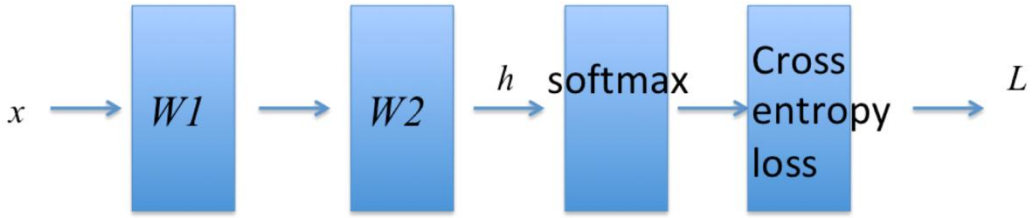
Filter kernel:

1	0	-1
0	1	0
-1	0	1

(2) What is the output if we instead perform convolution using padding = 1, stride = 2, and then apply ReLU?

Question 2

Given the following deep neural network classification system (three classes):



For a training sample x, the activation h before the softmax layer is given by

$$h = [2.1, -1.3, 0.7, 0.2, -0.5]^T$$

Suppose the ground-truth class of this training sample is the first class.

Compute L.

(Note: Use natural logarithm, i.e., logarithm to the base of e).

Question 3

Calculate the number of parameters in this CNN.