STAT3007/7007 Deep Learning, Tutorial 6

2022 Semester 2

1. (CNNs)

(a) CNNs can be considered as special types of MLPs. Why do we still prefer CNNs for image processing problems as compared to MLPs?

(b) Given the 5x5 identity array as the input, write down the results of applying the following filters to the input.

i. A 2x2 convolutional filter with stride 1, weights $\begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix}$, and bias 1.

ii. The same convolutional filter as (a), but with stride 2.

iii. The same convolutional filter as (a), but with dilation 2.

iv. The same convolutional filter as (a), but with input padded with two 0's on each side.

(c) Consider a CNN with an input layer of size 200x200, a single convolutional layer with 64 filters of size 11x11 and stride 1, and an output layer with 3 output neurons. All activation functions are ReLU. How many parameters are in the network? Include a bias term for each neuron in the convolutional layer and each output neuron.