Tutorial Questions | Week 5
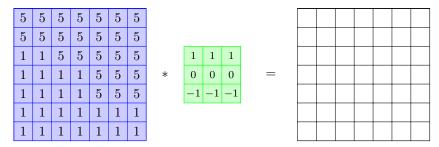## COSC2779 - Deep Learning

This tutorial is aimed at reviewing convolutions in deep learning. Please try the questions before you join the session.

1. What is the output of the following convolution operation?

5	5	5	5	5	5	5
5	5	5	5	5	5	5
1	1	5	5	5	5	5
1	1	1	1	5	5	5
1	1	1	1	5	5	5
1	1	1	1	1	1	1
1	1	1	1	1	1	1

$*$

1	1	1
0	0	0
−1	−1	−1

$=$

2. What is the output of Pooling the following input with 3x3 max-pooling with stride 2?

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

3. Calculate the output shape at the end of each layer and the number of parameters for the following network.

```
model = tf.keras.Sequential()
model.add(Conv2D(6, kernel_size=(5, 5), strides=(1, 1), activation='tanh', input_shape=(32,32,1),
    padding="valid"))
model.add(AveragePooling2D(pool_size=(2, 2), strides=(2, 2), padding='valid'))
model.add(Conv2D(16, kernel_size=(5, 5), strides=(1, 1), activation='tanh', padding='valid'))
model.add(AveragePooling2D(pool_size=(2, 2), strides=(2, 2), padding='valid'))
model.add(Flatten())
model.add(Dense(120, activation='tanh'))
model.add(Dense(84, activation='tanh'))
model.add(Dense(10, activation='softmax'))
```

4. Calculate the receptive field of the second convolution layer of the above network. What if the Dilation of first convolution layer was set to 2?

5. Calculate the receptive field of the second convolution layer of the above network *if the Dilation of first convolution layer was set to 2*?