Tutorial 4: Convolutional Neural Networks

1. Explain a) what a neuron is in neural networks, b) how the neurons are designed differently in multilayer perceptions and convolutional neural networks, and c) how neurons are organised to formulate a deep neural network.

2. How many neurons do we have if a 3x3 convolution kernel is applied on a 100x100 image?

3. Suppose a 3x3 convolution kernel is used in the first layer, a 4x4 convolution kernel is used in the second layer and a 5x5 convolution kernel is used in the third layer. What are the receptive fields of these three convolution kernels?

4. Can a linear model be represented with a convolution? If so, what is its receptive field?

5. Describe an analogous convolutional layer for audio.

6. Consider the following image

1	1	2	2	2
1	0	0	2	1
1	0	1	0	0
0	0	2	2	0
2	2	2	1	1

and a convolution kernel

0	0	1
0	1	0
1	1	0

What is the output of the convolution?