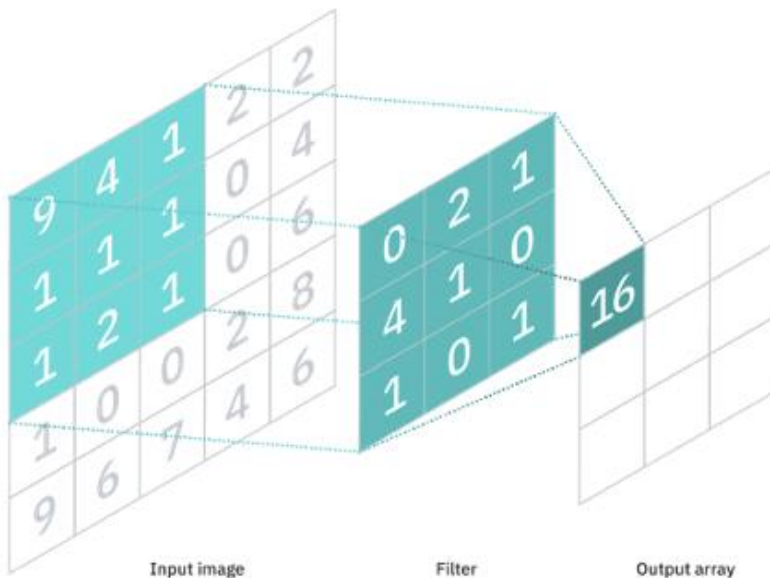


Machine Learning

Seminar 5

1. Explain input layer, output layer, hidden layer, neurons.
2. Draw a neural network version of linear regression with 4 inputs and 1 output. Draw a neural network of 4 inputs and 1 output with 2 hidden layers. The first hidden layer has 3 neurons, and the second hidden layer has 2 neurons.
3. For question 1, assume that the inputs are represented by x , output is y , the parameters are w , b and the activation function is sigmoid. Write down the equation of the hidden layer output.
4. Explain what convolution layer is. For the convolution layer below, what are the dimensions of the input and the filter.



5. Calculate the output of the convolution layer in question 4.

6. A neural network as shown in Figure (bias unit is not included) below. Can you compute the following values?

- For forward propagation, compute all $a_j^{(l)}$ ($l = \{2,3\}$)
- For backpropagation, compute all $\delta_j^{(l)}$ ($l = \{2,3\}$) (error) by using the given y .

Note: Forward Propagation is the way to move from the Input layer (left) to the Output layer (right) in the neural network. The process of moving from the right to left i.e backward from the Output to the Input layer is called the Backward Propagation. Backward Propagation is the preferable method of adjusting or correcting the weights to reach the minimized loss function. Include computation steps in your answer.

