

Laboratory 5 – Exercises

1. Perform the cross-correlation operation between an input tensor X of shape $(1,1,3,3)$ and a kernel tensor of shape $(1,1,2,2)$.
2. Define an input tensor of shape $(1,1,6,6)$ with random values. The two-dimensional convolutional layer should have as arguments: $c_in = 1$, $c_out = 1$, $padding = (2, 2)$ and $stride = (3, 2)$. Set the *kernel_size* argument such that the output shape of the convolutional operation to be $(1,1,2,3)$.
3. Perform the maximum pooling operation for an input tensor X of shape $(1,1,5,5)$. Use a pooling window of shape 2×2 and set the stride argument such that the output shape is $(2,2)$.
4. Classify the SVHN (Street View House Numbers) dataset (32×32 images, 10 classes, 73257 training images and 26032 testing images) using LeNet model. Divide the training dataset as follows: 30000 validation images and 43257 training images. Set the learning rate to 0.5.