Laboratory 4 – Exercises

1. Perform the cross-correlation operation between an input tensor with 3 input channels and the following kernel:

$$\begin{bmatrix} 0 & 1 \\ 2 & 3 \end{bmatrix}, \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, \begin{bmatrix} 7 & 2 \\ 3 & 5 \end{bmatrix}.$$

2. Classify the SVHN (Street View House Numbers) dataset (32×32 images, 10 classes, 73257 training images and 26032 testing images) using the LeNet model. Divide the training dataset as follows: 30000 validation images and 43257 training images. Set the learning rate to 0.5.

3. Classify the SVHN dataset using the following convolutional neural network architecture. Divide the training dataset as follows: 30000 validation images and 43257 training images. Train your model for 5 epochs using a learning rate of 0.05 and a batch size of 256. Define a class for implementing the Convolutional Block. Conv2d, 32, 3×3 means 32 output channels and 3×3 kernel size. Use padding, if necessary.