Deep Learning Lab

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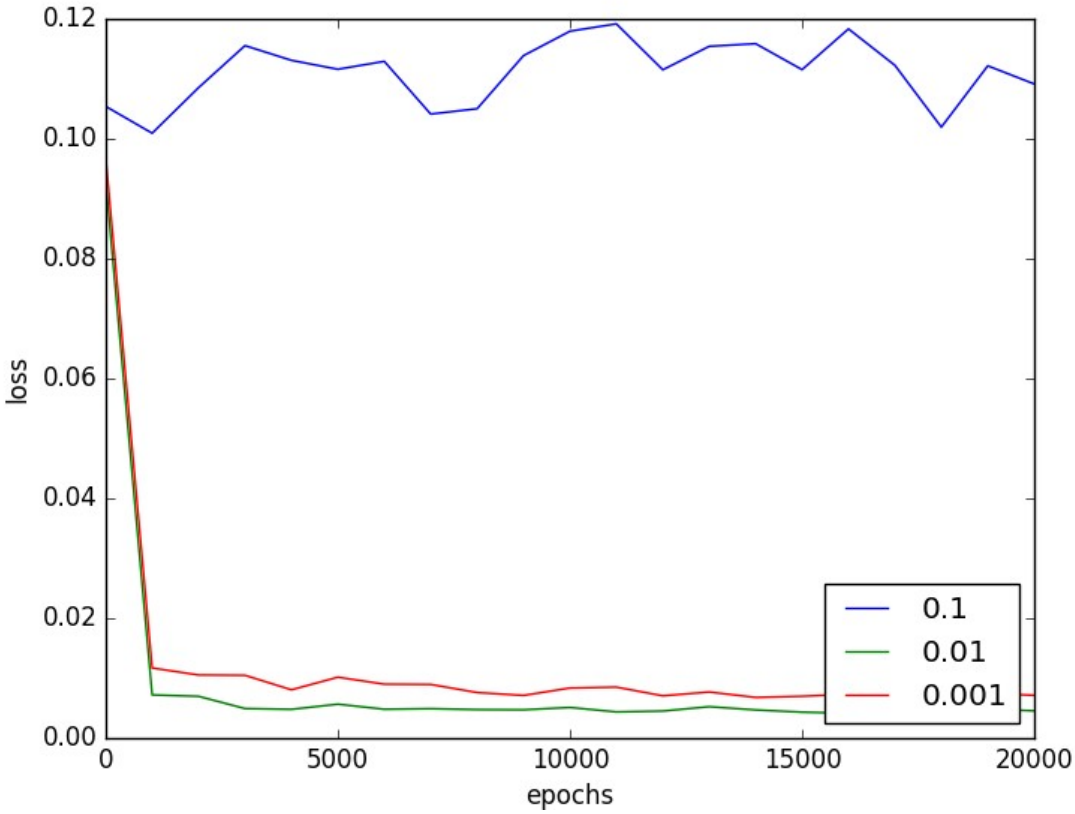
Exercise 3

In this exercise we built a Autoencoder , which is trained to recreate the given output to the network , implemented in Tensorflow.

- Autoencoder Architecture

We have 3 convolutional layers with decreasing number of 3×3 filters followed by RELU activations and a max pooling layer. Afterwards we have 2 transposed convolutional layers interleaved with 2 convolutional layers, to reconstruct the image. We use padding in each layer, so that the output resolution is the same as the input resolution. The network is trained by optimizing the sum of L2 losses with the Adam optimizer.

To see the effect of the learning rate on the networks performance, I trained the network with learning rates of 0.1, 0.01, 0.001 with a batch of 64 images and the according learning curves can be seen in the figure below.



From the figure we can see that the loss is decreasing rapidly after a small number of epochs when the learning rate is 0.01 and 0.001. But for learning rate = 0.1 the loss is between 0.10 and 0.12 and is not decreasing with the number of epochs. Since the loss is not decreasing for learning rate = 0.1, the network is not learning and this can be also seen from the reconstructed output image in the following figures.

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Figure 1
Reconstructed image with learning rate 0.1

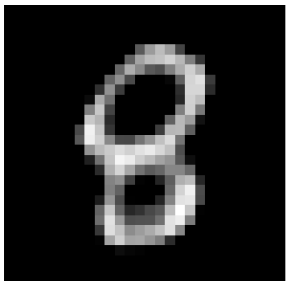

Figure 2
Reconstructed image with learning rate 0.01

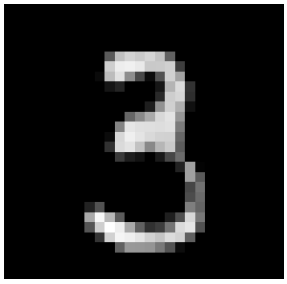

Figure 3
Reconstructed image with with learning rate 0.001