Report of Exercise 03

Implementation Approach

This exercise was implemented following the instructions on the exercise sheet, reusing what was implemented in the last exercise and the lecture slides of the newest lecture.

Results

Training of the Autoencoder

In the following Figure 1, results with various learning rates are shown.
The used learning rates were: $\{0.1, 0.01, 0.001\}$.

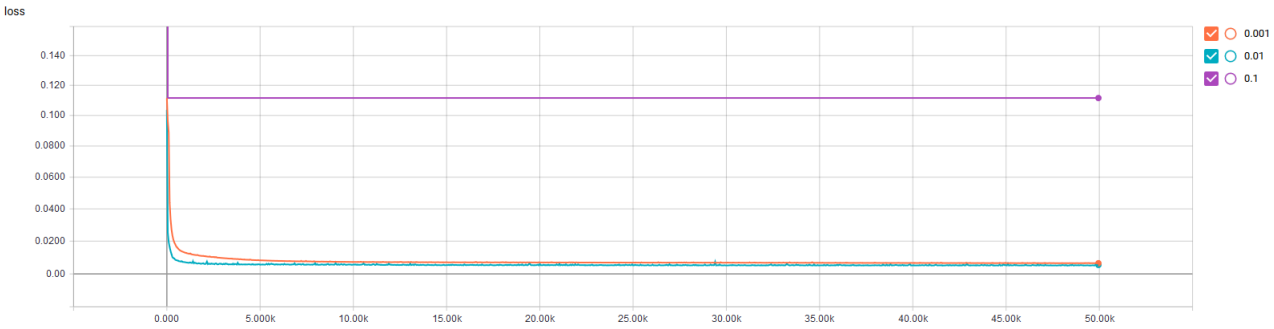

Figure 1: Different Learning Rates

The x-Axis indicates how many batches were used for the training session.

It can clearly be seen that the learning rate of 0.1 did not work out well. This could be explained with the Adam-Optimizer that was used. The chosen learning rate in this case was already too large.

Because of the chosen scaling in Figure 1, the learning curves for the other two rates can not be distinguished very well. Figure 2 below shows the curves for those two rates with a different scaling.

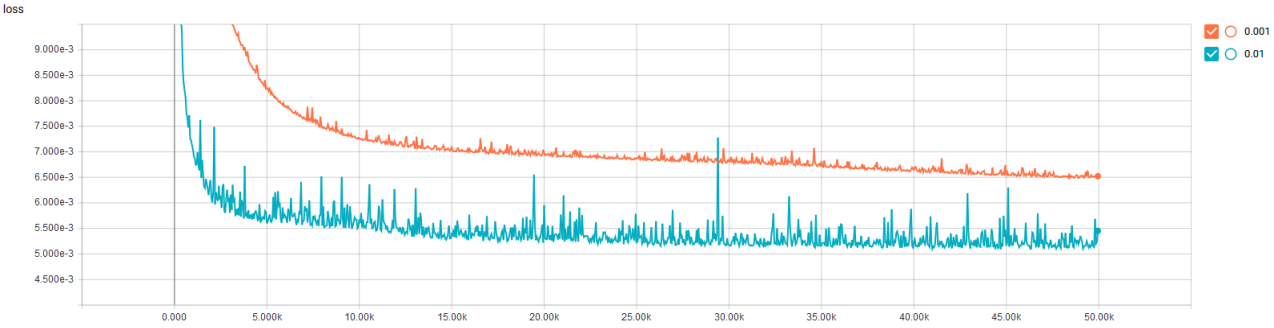

Figure 2: Smaller Learning Rates

Again, the x-Axis indicates how many batches were used for the training session.

Both learning rates result in small losses. While the curve for a learning rate of 0.01 suggests that it already converged and will not get better, even after more training, the curve for the smaller learning rate has clearly not converged, indicating that using the smaller learning rate might result in better results after more training.

The following figures (Figure 3, Figure 4) show a sample of images that the autoencoder got as an input and the corresponding images that were created.

Figure 3: Sample Images Input

Figure 4: Sample Images Output

Generally the images were created with not many differences. But taking a look especially at the numbers 6 and 9 it can be seen that the created images are not as sharp as the corresponding input images.