Assignment 3.2
Fully connected Autoencoder

Anders Segerlund

October 31, 2021

Autoencoder

After training the model for 800 epochs with the parameters stated OpenTA, autoencoder 1 and 2 are recreating digits which can be seen in Figure 1 and 2

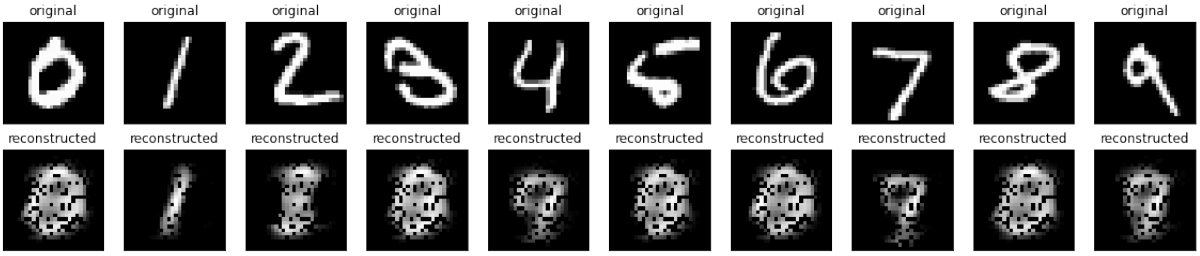

Figure 1: Recreation of digits from autoencoder 1

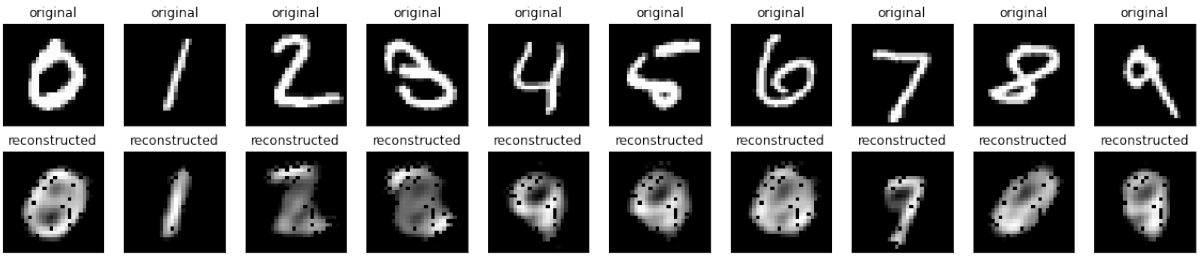

Figure 2: Recreation of digits from autoencoder 2

As can be seen in both Figure 1 and 2 the numbers 0 and 1 is fairly well recreated by both encoders, and digit 2 and 3 is barely recreated to a visible number by encoder 2.

Scatterplot

After creating the model, the output from the bottleneck is visualized in a scatterplot, see Figure 3. The conclusion that can be made from the scatterplot is that the encoder separates the digits by a boundary. This could explain why the digits 0 and 1 are represented are well recreated by both encoders which can be seen in Figure 1 and 2

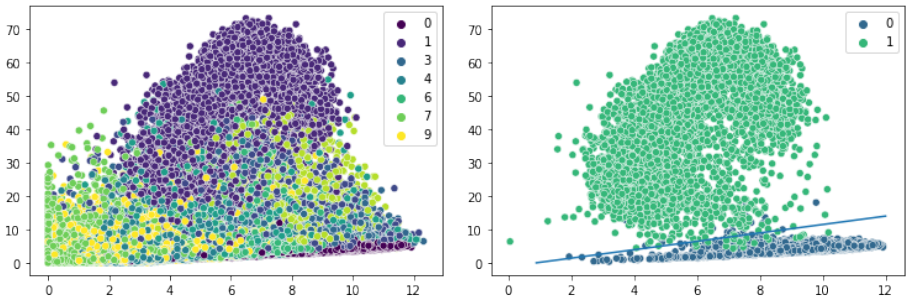

Figure 3: Output of bottle neck layer. (All digits and digits 1 and 2)

Conclusion

The scatter plot generated above indicates that the encoder separates the encoded digits by a boundary (see right illustration in Figure 3). This indicates that if we print the output from the auto encoder with 4 neurons, we can assume that digits with similar output values will recreate similar output. This

can be seen in Table 1 where the output of digit 0 is very similar to the output from e.g. digit 6 and thus generating a very similar output.

Digit	Bottleneck output
0	[3.8768482, 6.614709 , 4.2385807, 3.1260583]
1	[19.029282 , 2.8813946, 5.817218 , 24.564314]
2	[1.5064843, 5.0337963, 2.0138092, 4.010527]
3	[1.4265338, 5.095628 , 3.0702674, 2.5195072]
4	[1.2657216, 1.3120711, 4.456349 , 1.7130327]
5	[1.5750134, 2.1871858, 3.3879793, 1.4297109]
6	[2.1973648, 4.2976236, 2.7277212, 1.6997559]
7	[27.759682 , 1.7799237, 14.465729 , 17.859175]
8	[12.248258 , 3.016937 , 3.710522 , 5.5838223]
9	[1.9595857, 3.1680152, 4.3615503, 2.950197]

Table 1: Values of bottleneck in ancoder 2