



DD2437 Presentation Lab 4

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Part I: Auto-encoder for binary-type MNIST images

- Autoencoder with just one hidden layer. Stochastic gradient descent with constant learning rate and regularization.
- Had to choose for the number of hidden nodes : had to be lower than 784, dimension of the input space.
- Error = sum of the mean error between original input and the reconstructed output after 100 epochs.

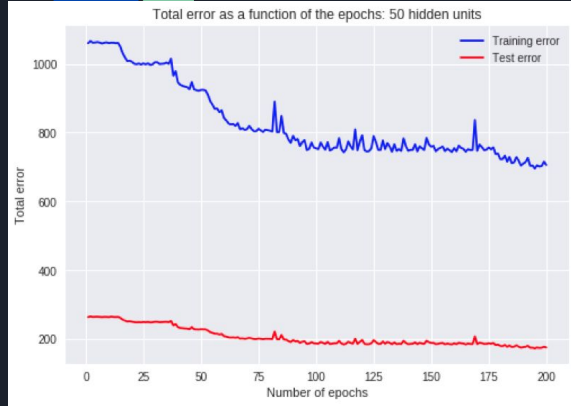


Figure 1: Total error as a function of epochs, 50 hidden units

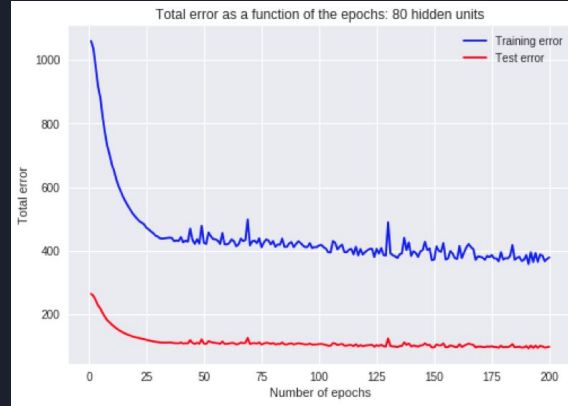


Figure 2: 80 hidden units

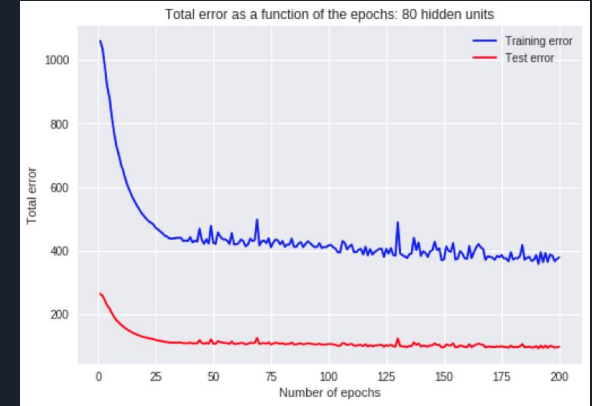


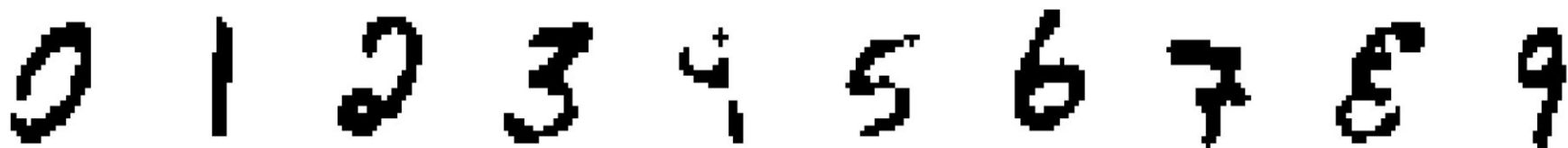
Figure 3: 120 hidden units



Original digits :



Reconstructed digits :



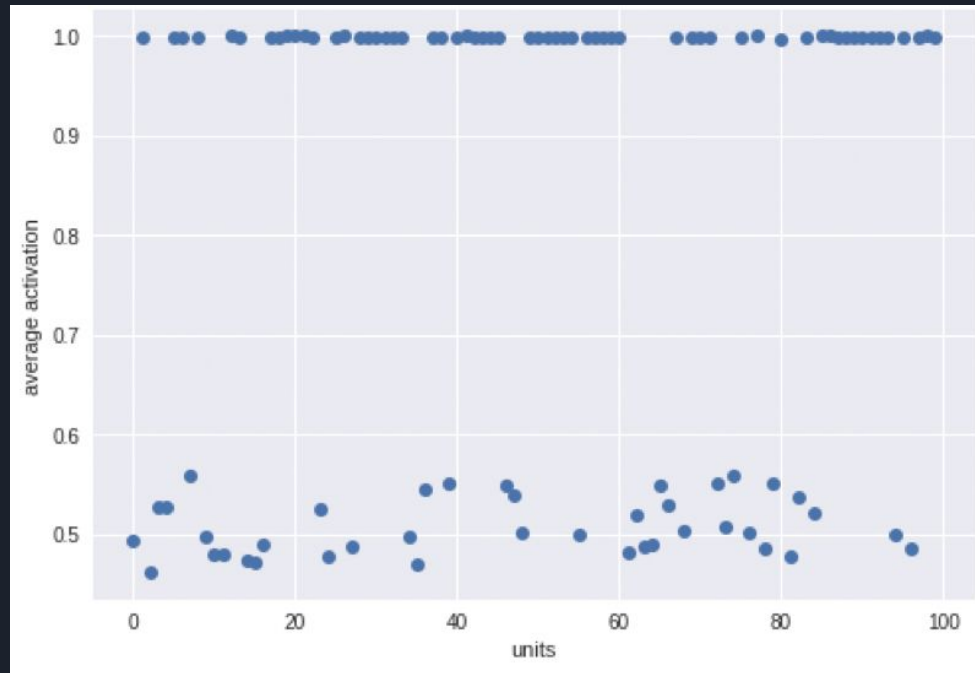
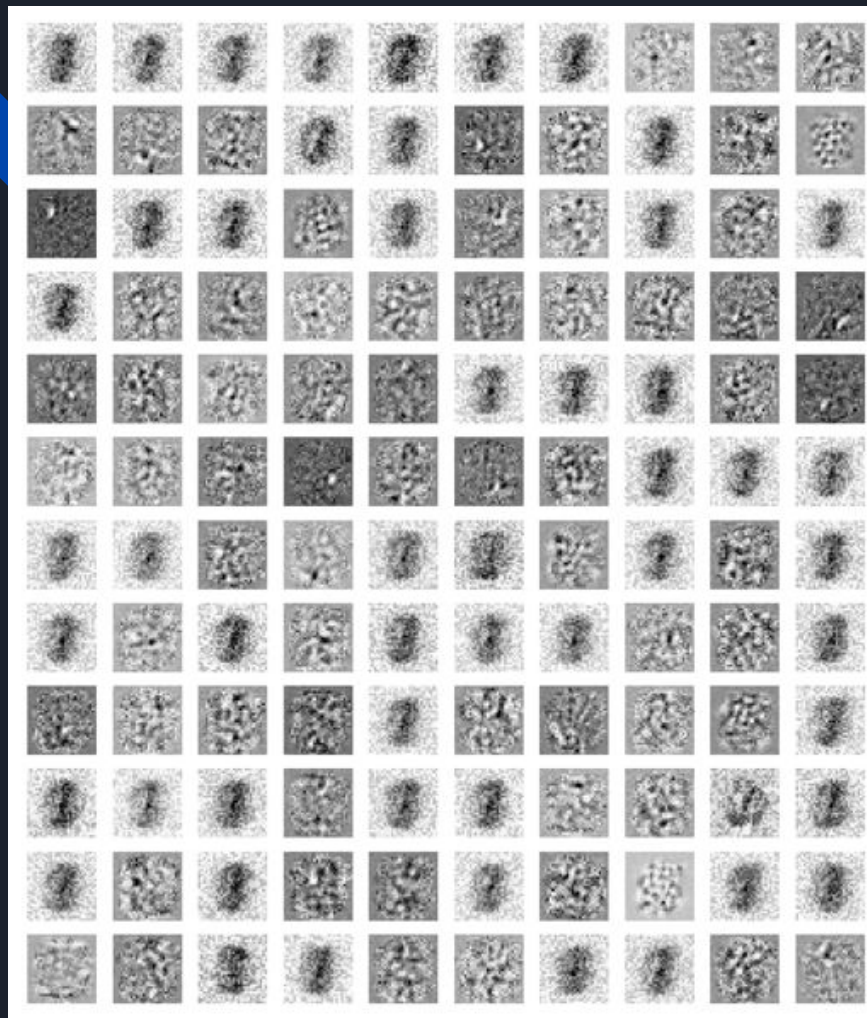


Figure 4 : Sparseness for a hidden layer with 120 hidden nodes



*Figure 5 : Weight vectors
associated with the 120 hidden
nodes.*

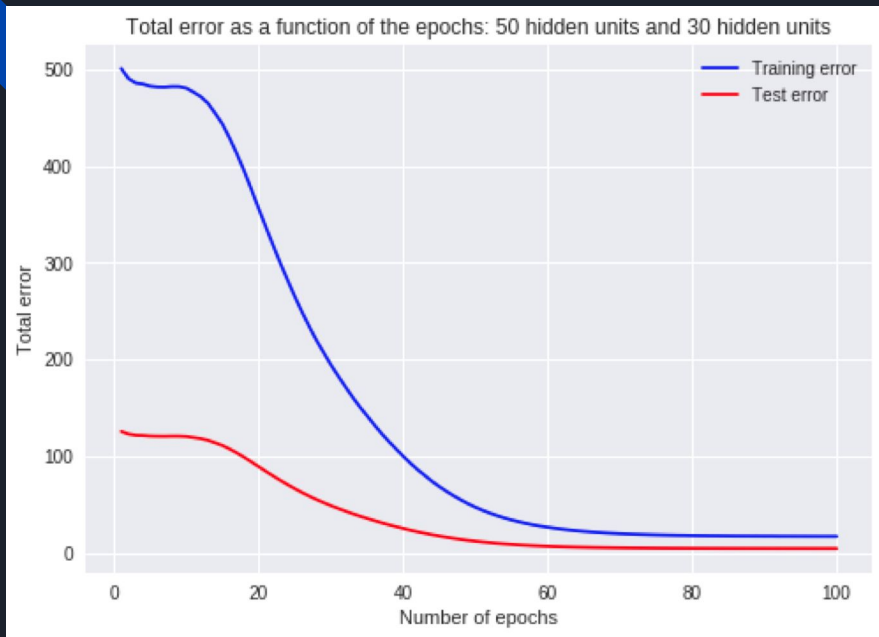


Figure 6 : Total error for stacked autoencoder, respectively of 50 hidden nodes and 30

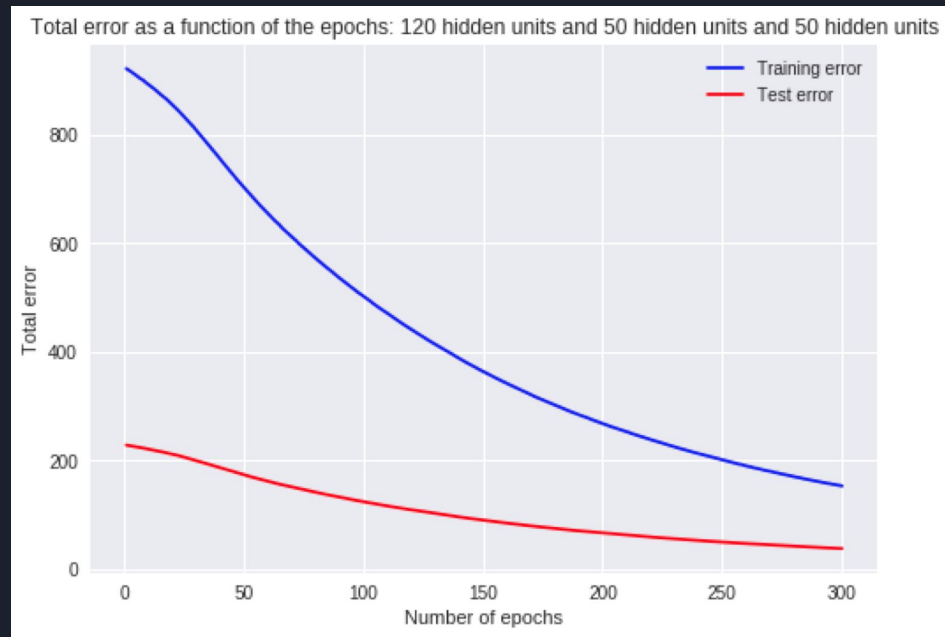



Figure 67: Total error for stacked autoencoder, respectively of 50 hidden nodes and 50



```
clf.score(hidden_3_act_dict_tst['120_50_50'], targetdigit_tst)
```

0.86

*Figure 8 : Score for the 120-50-50
network.*

```
ae.score(bindigit_tst, targetdigit_tst)
```

0.934

*Figure 9 : Score for the 120-50-50
network and fine-tune with
backproagation.*