Øving 5

mandag 4. november 2019 17.43

Task 1 Theory [1point]

A)
You need 2 rows of padding around the input image. To get the same size on the output image.

B)
The spaltial dimention of the kernal has to be 9x9. This way you have 4 pixels on each side which are not carried over, 8 reduction in total. 512-504=8.

C)
256x256. The pooled future map will be halfed.

D)
The deapth is 36.
The image has 3 channels, RGB. We times this with the number of future maps from b) whitch is 12.

E)
Assuming the input into the second layer still is 512x512, the output would be 510x510.

F)
Trying to follow this tutorial:
Learnable Parameters in a Convolutional Neural Network (CNN) explained
www.youtube.com/watch?v=gmBfb6LNnZs

Formel: inputs x outputs + bias
RGB, image size 32x32, filter size 5x5

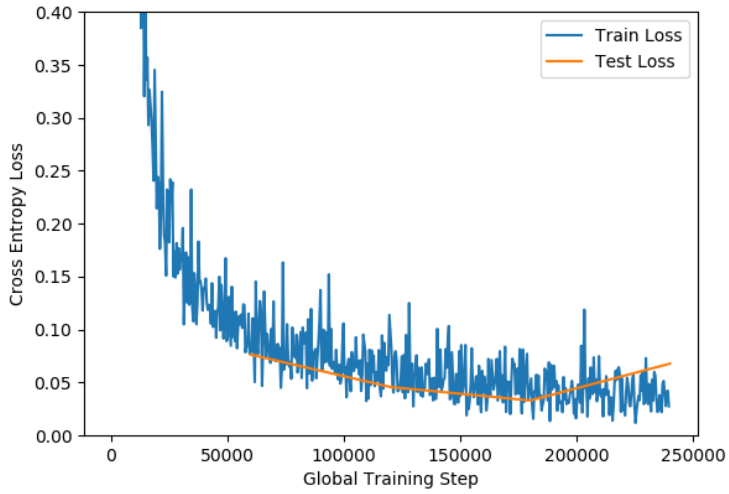
1 c layer: 32 filters/bias + 3 input * 32x5x5 output
2 c layer: 64 filters/bias + 32 input * 64x5x5 output
3 c layer: 128 filters/bias + 64 input *128x5x5 output
4 full connected: 64 filters/bias + 2048 input * 64 output
5 full connected: 10 filters/bias + 64 input * 10 outputs

This gives us: 2432 + 51264 + 204928 + 131136 + 650 = 390410

Task 2

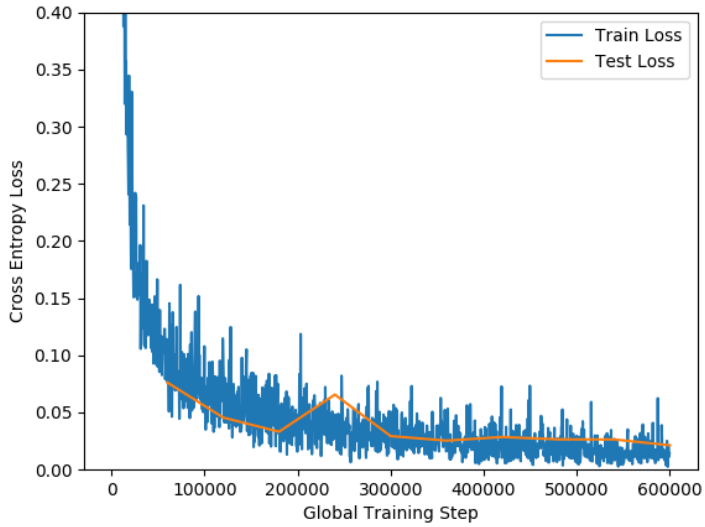
A)
Skipt this

B)



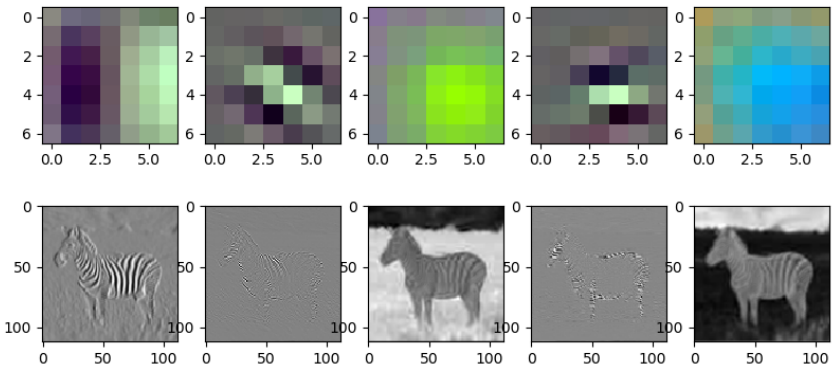
Final Validation loss: 0.0678508920625822. Final Validation accuracy: 0.9755
The increase of test loss graph indicates that we have overfitted the network.

C)



Final Validation loss: 0.02132058558855087. Final Validation accuracy: 0.9929
The previous encrease in test loss was not because of overfitting, as shown in the graphs. If it were the test loss would have increased even more. It does not look like this network has been overfittet yet, but it has flattend out quite a bit.

D)



Here is the result of the visualization

E)
The filters findes the following features in the sebra image, from left to right.

1. Vertical edges – the dark blue and white in the filter highlights the vertical edges
2. Slanted angle finder – the white and black pattern highlights the places where we have a slanted angle
3. Findes green color – the places in the picture where we find the color green we the picture becomes highlighted
4. Reverse slanted angle finder – same as 2 just the opposite way
5. Findes blue color - same as 3 just with blue instead

Task 3

A)
The convolution theorem says that one needs to have suitable conditions for the Fourier transfomration to convolve. Then the convolution in one domain equals point-wise multiplication in the other domain. One can then use the inverste fourier transform to end up with

$$f \cdot g = \mathcal{F}^{-1}\{\mathcal{F}\{f\} * \mathcal{F}\{g\}\}$$

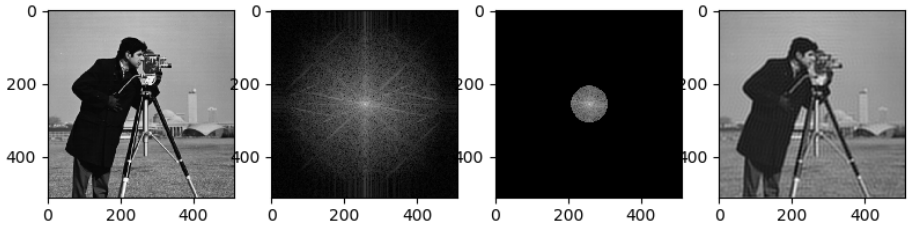
B)
High-pass filters lets through high frequences and removes low frequences. The low-pass filter does the oppisite.

C)
In the filters the lower frequences are located in the middle. The lighter color shows which frequences are let through.
A is a high-pass filter whitch lets trough some of the high frequences.
B is a high-pass filter whitch lets trough most of the high frequences.
C is a low-pass filter whitch lets trough most of the low frequences.

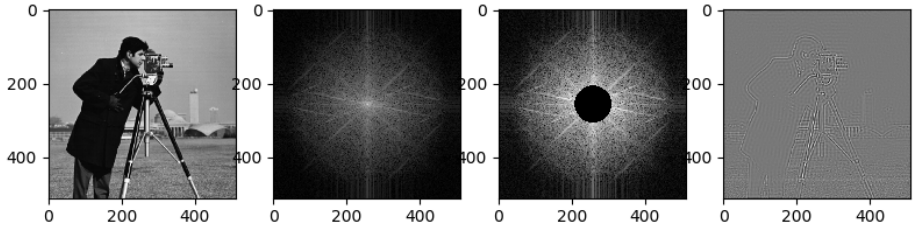
Task 4

A)

Low pass



High pass



B)

Did not have time to Complete anymore