2D Image Processing
Exercise session 2

Machine Learning and PyTorch

Date: 18.05.2018
Room: **48-379**

1 Questions **(Deadline: 18.05 - before the tutorial class)**

Answer the following questions and prepare a pdf document for submission send them via email before the exercise session to kripasindhu.sarkar@dfki.de

1. What is “hysteresis” in image edge detection?
2. What is the difference between classification and regression?
3. What is the difference between ‘Score function’ and ‘Loss function’?
4. What is gradient of a function?
5. Find the gradient of the function f(x, y, z) = (2*x) + (y*z) using back propagation when the input is x = 1, y = 2, z = 3.
   (either write the notations in the document or include a photo of the network/computations in the document)
6. What is the use of activation functions in multilayered fully connected networks?
7. What is the output of the activation volume from a convolutional layer when the input volume is of size 227 x 227 x 3, with the following conv parameters -
   number of filters: 96, special extent (kernel size): 11x11, stride: 4, padding: 0

2 Exercises

All the following exercises use IPython notebooks. In case not familiar, use the following 5 mins tutorial on ipython notebook from the stanford course: http://cs231n.github.io/ipython-tutorial/

2.1 Convolution layer **(Deadline: 18.05 - 23:59 Hrs)**

Go to the folder ConvLayer and open ipython notebook - CNNTut.ipynb. You will have to implement a function ‘conv_forward_naive’ depicting the operation of convolution layers. Finish the notebook and submit the a pdf version of the notebook.

Produce the pdf by the following way. Run the following from your assignment directory:

```
jupyter nbconvert --to html FILE.ipynb
```

where FILE.ipynb is the notebook you want to convert. This will create an html file of the notebook. Convert the html into pdf using any of the web browser you are using.

2.2 Pytorch - Official 60 Minutes Blitz tutorial **(Deadline: 25.05)**

1. Install PyTorch:
   Go to the home page https://pytorch.org/
   Run the command for pip package manager with the python version of your choice.
   Example command: pip install torch torchvision

2. Complete the famous Pytorch Tutorial - PyTorch: A 60 Minutes Blitz in the following link:
https://pytorch.org/tutorials/beginner/deep_learning_60min_blitz.html

In each page you will see a link to download the ipython notebook. Download them into the folder 'PyTorch60m' one by one and complete them. Submit a pdf file concatenating the outputs of all the notebooks.

In each tutorial notebook, try to understand the concepts being taught, instead of just running their code.

Note about the deadlines -
Please submit as soon as you finish the assignments. It is preferred get some submissions of the exercise 2.1 before the tutorial to have a good discussion. In case you are stuck we will discuss the solution idea during the tutorials session.