Exercise 0 for MA-INF 2201 Computer Vision WS19/20
08.10.2019
Submission on 13.10.2019 11:59 AM
Introduction to OpenCV

Strict rules you have to follow for all your submissions for this course:

- You are required to write code compatible with Linux, python 3.6, numpy 1.17.2 and opencv 4.1.1.
- For each exercise, we will include all the packages you are allowed to used in the template code. You are not allowed to use any other package.
- The code must run and must not return obviously rubbish results. (Like completely black images instead of reasonable output, accuracies of 1% etc.)
- Do not cheat and copy your solution from anywhere. We need to see that it is your code and you understand what you are doing

If you violate this rules and we are in bad mood that day, we might simply give you 0 points.

This sheet is to get used to OpenCV. Hint: Install python, opencv-python and numpy in your virtual enviroment (for example using `anaconda`) to avoid library conflicts on your machine.

1. Read an introduction to OpenCV and write a program that reads the image `bonn.png` and displays it using `imread` and `imshow`. *(0.5 Points)*
2. Convert the image into an intensity image using the function cvtColor and display it. *(0.5 Points)*
3. Multiply the intensity image I by 0.5 and subtract it from each color channel. Make sure that the values do not become negative, i.e. the new (R, G, B) values are (max(R 0.5I, 0), max(G 0.5I, 0), max(B 0.5I, 0)). Do this by using pixel-wise operations in a nested for-loop. Display the result. Hint: OpenCV reads the images in `BGR` format in contrast to the commonly adopted `RGB` format.*(1 Point)*
4. Perform the operation above in a one-line python statement. Hint: you can use expand dims function in numpy to add additional dimension in a numpy array. *(1 Point)*
5. Extract a 16×16 image patch out of the original image centered at the middle of the image, display it, and copy the content to a random location of the image. Hint: you can use `random` python module to generate random numbers. *(1 Point)*
6. Draw 10 random rectangles and 10 random ellipses on the image using rectangle and ellipse and display it. Fill the shapes with the colors of your choice. *(1 Point)*

Please write the names of your group members in the README. Note that the points from this sheet are bonus points. However, it is strongly recommended that you solve the exercises to get experience with OpenCV.