Exercise for MA-INF 2201 Computer Vision WS16/17
18.10.2016
Submission until 23.10.2016, 23:59
Introduction to OpenCV

You are required to write your code in **C++**. To compile and run the program, please follow the instructions in the README. Your code must compile and run on **Linux**. For compatibility reasons, please use OpenCV **2.x** (not version 3, most functions have changed). Version 2 should be in the Ubuntu repositories. Also, please **comment** your code.
You can find an introduction to OpenCV here:
`http://docs.opencv.org/doc/tutorials/tutorials.html`.

1. **Getting used to OpenCV**:

   (a) Read the **Introduction to OpenCV** and write a function that reads the image `bonn.png` using `imread` and another function that displays it using `imshow`.
   (0.5 Points)

   (b) Convert the image into an intensity image using the function `cvtColor` and display it.
   (0.5 Points)

   (c) 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 $(\max(R - 0.5I, 0), \max(G - 0.5I, 0), \max(B - 0.5I, 0))$. Use `subtract` for this task. Display the result.
   (1 Point)

   (d) Do the same by pixel-wise operations using `isContinuous` and `ptr<>`.
   (1 Point)

   (e) 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 using `rng`.
   (1 Point)

   (f) Draw 10 random rectangles and 10 random ellipses on the image using `rectangle` and `ellipse` and display it.
   (1 Point)

Upload your solution to Sciebo until Sunday, $23.10.2016, 23:59$. 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.