INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA
MESTRADO EM ENGENHARIA INFORMÁTICA E DE COMPUTADORES
MESTRADO EM ENGENHARIA INFORMÁTICA E MULTIMÉDIA
IMAGE PROCESSING AND BIOMETRICS

First Laboratory Class - OpenCV
1st semester, 2021/2022 (October, 22)

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1. **Open Source Computer Vision (Open CV) environment - setup, documentation, examples, and demos.**
   You can find some information regarding Open CV here: `https://en.wikipedia.org/wiki/OpenCV`.

   (i) The Open CV main webpage is `https://www.opencv.org/`. Download and install OpenCV 4.5.4 or earlier following the instructions on the following webpages:
   (1) `https://github.com/opencv/opencv`;
   (2) `https://sourceforge.net/projects/opencvlibrary/`
   (3) `https://docs.opencv.org/master/df/d65/tutorial_table_of_content_introduction.html`;
   (4) `http://opencv-java-tutorials.readthedocs.io/en/latest/01-installing-opencv-for-java.html`.

   After installation, check on the contents of the `opencv` folder and its subfolders.

   (ii) Take a look at the following documentation and demos regarding OpenCV.
   (1) The list of tutorials, at `https://docs.opencv.org/master/d9/df8/tutorial_root.html`. Spend some time analyzing the key features of these tutorials.
   (2) Tutorials on the Core Functionality module (core module), at `https://docs.opencv.org/master/de/d7a/tutorial_table_of_content_core.html`
   (3) Tutorials on the Image Processing module (imgproc module), at `https://docs.opencv.org/master/d7/da8/tutorial_table_of_content_imgproc.html`

   Try to run some of these demos. For instance, the `MatMaskOperations`, should display a result, similar to the one depicted in Figure 1.

   (iii) Take a look at the tutorials available at `http://opencv-java-tutorials.readthedocs.io/en/latest/`, mainly on the first four tutorials:
   (1) `http://opencv-java-tutorials.readthedocs.io/en/latest/01-installing-opencv-for-java.html`
   (2) `http://opencv-java-tutorials.readthedocs.io/en/latest/02-first-java-application-with-opencv.html`
   (3) `http://opencv-java-tutorials.readthedocs.io/en/latest/03-first-javafx-application-with-opencv.html`
   (4) `http://opencv-java-tutorials.readthedocs.io/en/latest/04-opencv-basics.html`

   Follow these tutorials and try to reproduce on their results, in order to have sample projects to solve different image processing problems.

   (iv) The repository available at `https://github.com/opencv-java` has many Open CV demos. Many demos address the Eclipse IDE. In case you use the Intellij IDEA IDE, the information at this URL `https://medium.com/@aadimator/how-to-set-up-opencv-in-intellij-idea-6eb103c1d45c` may be useful.

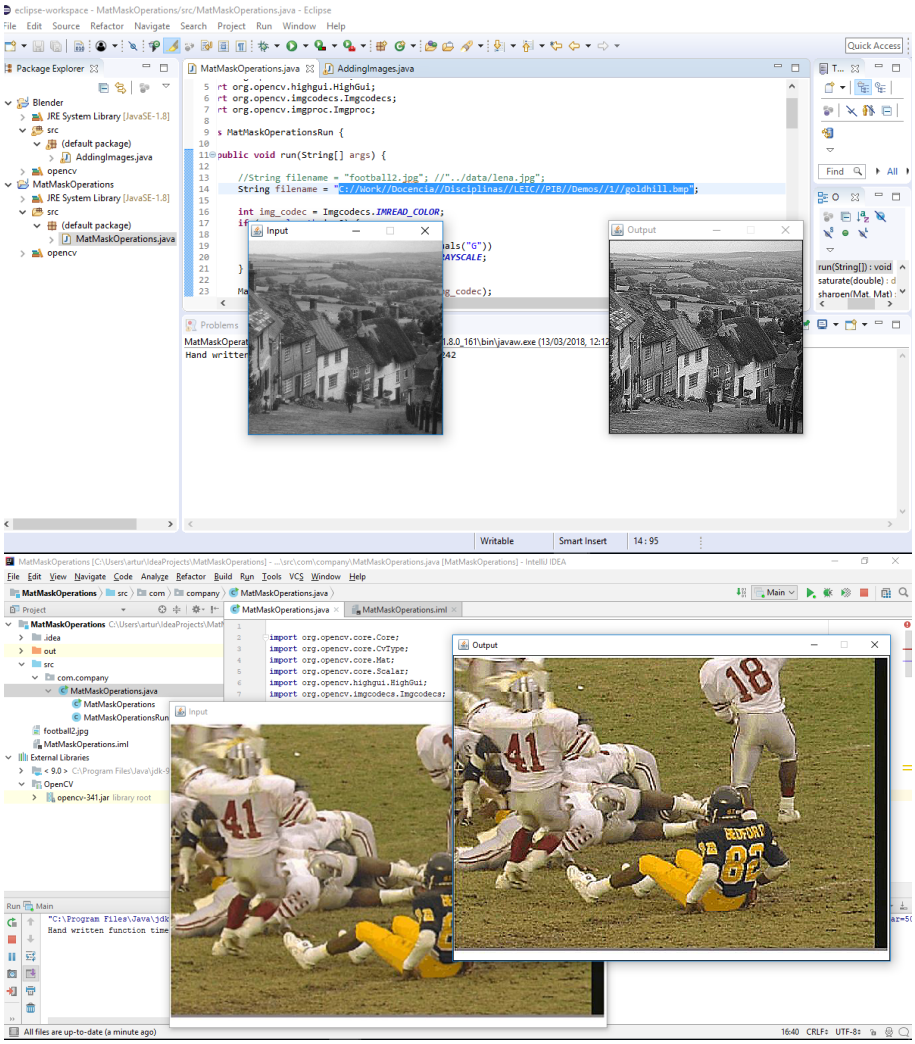

Figure 1: The Open CV demo MatMaskOperations, available at `https://docs.opencv.org/master/d7/d37/tutorial_mat_mask_operations.html` running on: (a) Eclipse (b) IntelliJ

2. **[OpenCV- Exercise 2]**.
   The goal of this exercise is to perform Digital Image Processing (DIP) techniques using OpenCV.

   (a) Using OpenCV and by modifying the demos, write software to perform the following DIP actions:

   (i) Brightness decrease and increase with a technique at your choice.

   (ii) Contrast adjustment with an intensity transformation technique.

   (b) Report some experimental results of the developed software, for the 256×256 Boat, Mandrill, and Squares images, available at `http://links.uwaterloo.ca/Repository.html`