Bachelor 3 - CS – **2020-2021**
TU Digital Forensics

UNIVERSITY OF SCIENCE AND TECHNOLOGY OF HANOI
VIETNAM FRANCE UNIVERSITY

THIS LABWORK IS MANDATORY.
YOU ARE ASKED TO DEPOSIT ON A GITHUB ACCOUNT ALL THE PYTHON CODES (USING OPENCV LIBRARY) AND A PDF FILE CONTAINING ALL REMARKS, EXPLANATIONS AND JUSTIFICATIONS NEEDED.
PLEASE INVITE ME TO GRANT ME AN ACCESS TO YOUR PROJECT (MY GITHUB ACCOUNT IS HTTPS://GITHUB.COM/NSIDERE)

DUE DATE IS 22 OCTOBER 2020

BINARIZATION

Binarization consists in transforming a grayscale image into a binary image, that is to say, an image whose pixels have a value of 0 or 1.

1 - Arbitrary threshold
For all of the images below, ARBITRARILY determine a binarization threshold and assess the difficulty in applying the thresholding operation. Arbitrarily means that the choice is based by looking at the image (pixels intensity) only

- First category of images: forme1.png and house8.png.
- Second category of images: woman.png.

Conclude on this technique for choosing the threshold.

2 - Threshold with the histogram
Using the histogram, determine the threshold that you think is optimal for the same images as above.

With the same method binarize the image forme3.png.

- What do you observe? Why ?
- Conclusions on the ease (or difficulty) to binarize an image, that is to say to separate the substance from the form?

3 - Thresholding by the Otsu method
One of the most famous method to automatically calculates a threshold is the Otsu method. You will find the documentation for OpenCV here :
https://www.docs.opencv.org/master/d7/d4d/tutorial_py_thresholding.html

Apply this method to images: forme1.png, lena.png, and forme3.png.
1 - What do you get for each of these images.
2 - Was the threshold obtained with the Otsu method close to that determined previously?

MORPHOLOGICAL TRANSFORMATION

To know more on morphological transformations, read and work on the following tutorial

https://docs.opencv.org/master/d9/d61/tutorial_py_morphological_ops.html

APPLICATION EXERCISES

For the exercises below, for each method proposed, you will describe each step precisely, indicating the effects produced during the application on the image.

1 - Text extraction

The cadastre1.png image is part of a 19th Century Paris cadastre map that was digitized.

- Suggest a method to obtain a binary image containing only the text as far as possible.

Note: the original image is a color image, you will take care to convert it to grayscale before doing your processing .

2 - Extraction of objects

The cadastre2.png image represents the housing plots of a digitalized 19th Century cadastre map of Paris.

- Suggest a method to obtain a binary image containing only the thickest walls.

Note: the original image is a color image, you will take care to convert it to grayscale before doing your processing.

- How do I get only the thinnest walls?