Image Processing Lab Exam

Introduction

For each question, you should convert the input image to the output image.
You should solve the exam model based on the formula:

- For semester students: solve the exam with the number = [(BN % 3) +1]
- For credit students: solve the exam with the number = [(ID % 3) +1]

Each test has its own folder with the name t# (for example t1 is test 1). Inside each folder, you will find each input and its corresponding output.

You should complete only the functions related to your requirements in main.py. Other questions won't be graded (as the grader in automated).

Exam Material

1. **environment.yml**: contains valid environment to use.
   You should start a new environment for the exam.
   ```
   conda env create -f requirements.yml
   conda activate iplabexam
   ```
2. SEM-99-99: contains a dummy submission (make sure your submission follows the same format (explained below)).

Submission format

Your submission should be a compressed file containing one directory named "SEM-##-##" or "CRD-#######" based on whether the student is credit or semester. Examples:

- "SEM-01-09" : Semester, Section 1, BN: 9
- "SEM-02-30" : Semester, Section 2, BN: 30
- "CRD-1234567" : Credit , ID: 1234567

The directory should contain a python file named "main.py". [Optionally (and recommended), you can also submit your jupyter notebook].

Notes

- Do **NOT** change the prototype of functions (neither names nor parameters).
- Do **NOT** change main.
- You should NOT depend on the coordinates of the image, as your code will be tested on other test cases.
- Make sure your code can run as a standalone unit (doesn't depend on functions from other files).
- Each function should return the result image.
- Use the attached jupyter notebook for **testing** and **visualization**, but all your **LOGIC** should be inside **main.py**.
- Test your code before submission
- Your compressed archive should be the same as indicated here{STRICTLY: case, format, hyphen and etc.] , otherwise, the autograder won't be able to run it.

- Syntax errors result in zero grade
- Cheating results in -5 in course grades.

Code Hints

- Make sure you are working inside “iplabexam” environment.
- If you changed main.py and the effect doesn’t appear in jupyter, restart the kernel.
- You are allowed to use any functions used in the labs, if you have to choose between some values, you can use these values in these hints:

Smoothing

- You are allowed to use:
    - skimage.filters.median
    - gaussian use (sigma=1.5)

Contrast Enhancement

- You are allowed to use:
    - negative
    - gamma_correct(img, 1, 3)
    - gamma_correct(img, 1, 0.5)
    - equalize_histogram

Edge Detection

- You are allowed to use:
    - sobel
    - sobel_h
    - sobel_v

Morphology

- You are allowed to use:
    - binary_opening (selem=np.ones(10, 10))
    - binary_closing (selem=np.ones(10, 10))
    - binary_erosion (selem=np.ones(20, 20))
    - binary_dilation (selem=np.ones(20, 20))
    - skeletonize()
    - thin(max_iter=10)

Segmentation

- You are allowed to use:
    - threshold > (130/255)
    - Segmentation by channel

All thresholding methods are allowed.
Frequency domain operations are allowed.