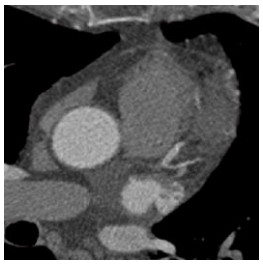
Image Processing (NCTU CS, Fall 2019)
Programming Assignment #1 (due 10/29/2019)

Your first task is to enhance the supplied images using techniques of contrast adjustment, noise reduction, color correction, and so on. There are 6 images supplied (5 regular photos, and one CT). They might not need the same kind of processing. As a result, you should write your processing techniques as modules so that you can try different combinations or parameters for different images. Try to do your best.

Note: For the CT image, you can only do noise reduction. No contrast or color adjustments here.







For the image enhancement part, you should create an enhanced output image for each input image. Name the output image `P1im1_xxxxxxx.bmp`, `P1im2_xxxxxxx.bmp`, and so on, with the `xxxxxxx` being your ID number. Submit the best output image you can get. Additional output images can be included in your report.

You can use either MATLAB, C/C++, or Python 3.x for the project.
Regarding the restriction on toolbox/library usage:

You CAN use toolbox/library functions for:

- Image reading, writing, and display.
- Color space conversion.
- Matrix operations not specific to images.

You CAN NOT use toolbox/library functions for:

- Image resizing.
- Intensity transformations.
- Histogram computation.
- Spatial filtering. (This includes functions for doing correlation, convolution, template matching, etc.)

If you're not sure about whether something can be used or not, ask the instructor.

About the submission:

- Submit your report and images through New E3.
- Each submission should consist of the following:
  1. A report (max. 15 pages, not counting the code listing) including the following sections:
     - Introduction / Objectives
     - A review of the methods you have used (be concise)
     - A explanation of the experiments you have done, and the results.

- Discussions: Your observations, interpretations of results, and remaining questions.

2. The report should be typed single-spaced, with 12-point font size.
3. Include the program code listing at the end of your report, starting from a new page as a separate section.
4. The 6 output image files.

- Do not submit files in ZIP or RAR or other compressed forms. Do not submit program codes in separate files.

The grade of each project is based on the following:

- Quality of your outputs.
- The amount of effort you put in.
- Quality of your report (organization, clarity, completeness, depth).
- Quality of your code (correctness, efficiency, clarity, documentation).

Other notes:

- Late submission: 10% deduction per day, up to until the submission is closed (usually one week from the due date).

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Some notes about processing speed, to be discussed in the class:

- Separable spatial filters.
- Speeding up median filters (only practical if you're using C/C++).
- Using lookup tables for intensity transformations.
- Vectorization, if you're using MATLAB or Python.