2 (maximum) **People team Term Project.**

All Teams must have the following features/tools in your program:

1. Compute and display the histogram of an image, show parameters such as mean, standard deviation

2. Reducing the number of gray levels (in integer powers of 2, from 256 to 2)

3. Zooming and shrinking an image using nearest neighbor interpolation, Bilinear Interpolation

4. Adjust image contrast and brightness through intensity transformation techniques. Discuss the results from different techniques.
   - Negatives,
   - Logarithm,
   - Power-law,
   - Piecewise-linear transformations, and
   - Histogram techniques.
   - Algorithms developed by your team if any.

5. **Image Filtering in both Spatial Domain and Frequency Domain with selection of either (a) or (b). Note:** you are welcome to do both for your benefit of learning.
   a. **Image smoothing**. Discuss your results from different filters.
   b. **Image sharpening**. Discuss your results from different filters.

6. **Noise Reduction**. Discuss your image processing results from different techniques, and/or combination of different techniques.
   - Mean filters: arithmetic, geometric, contra-harmonic;
   - Order-Statistics filters,
   - Adaptive filters

   Suggestions: **Using the images in the text book to check if your functions work properly.**

7. **Processing on given images with specific issues**. Based on the problems in each image, propose your approach, and given your processed resulting images. Analyze your results with conclusion of what are improved and what need more improvement.

8. **Extra related to DIP**. This is voluntary for the teams who are interested to go into more depth.

Note:
- Your program should take image size including both the horizontal and vertical dimensions as input parameters.
- Be able to choose a region of interest for image enhancement and local processing
- Your program should allow user choose different sizes of fillers (e.g., 1x1, 3x3, 3x5, 5x5, etc.)
- **To be reviewed in the mid-term (to be scheduled during the semester)**. Each team will show their project functions. Suggestions may be provided accordingly.
- **You may add any other functions**.

Turn in materials for your term project:

Hard copy: The entire report must be on a standard sheet size (e.g., 8:5 x 11 inches), stapled with three or more staples on the left margin to form a booklet, or bound using clear plastic standard binding products.
Electronic copy: you also **must** turn in an electronic copy which include
- Your project *executable file*,
- Program *code* with detailed commands,
- *Report*, and
- Your term project presentation.

In your report, you <u>MUST</u> include the following items:

I. Cover page.
- Project title
- Project number
- Course number
- Team members' names, and IDs
- Date due, and date handed in

II. Abstract. (Not to exceed 1 page)

III. Introduction. (Up to 3 pages) addressing the problems to solve, etc.

IV. Technical discussion: up to *fifty* pages (max).
You need to give technical solutions to each listed specific problem. E.g., for opening a jpeg file, what function(s) do you use to fulfill the tasks; to reduce a specific noise, what techniques /algorithms you applied and developed to solve the problem.
Note: you need to list the functions in the appendix.

V. Discussion/comparison of results: up to *sixty* pages (including images).
Results to each listed specific problem: Image results (printed typically on a laser or inkjet printer, images should not exceed 3"x3" in the prints). All images must contain a number and a title to be referred in the discussion of results. If you use images from the textbook, you need to refer to the figure numbers in your report.

VI. Appendix:
- Project/workspace name
- List of functions which run/work
- Flow chart of your program
- List of the major classes and their functions you have in your projects. Please note the sources of the classes and the functions, namely, product of your team or tools available from MS build-in tools, or any other sources.
- Program codes which your team produced.
- Pictures of your graphic user interface, and explanation of different features in the interface.
- Presentation materials
- ***Contribution to the project from each team member*** (Please specify who did what in the project. If more than one team member contributed to a part, please specify the % of effort.)