Project 1

Each group should

- Submit one report (in pdf) per group containing procedures and results of Part A and Part B by end of Jan. 19 to Canvas. See Report Guidelines below.
- Attach your well-documented code to the report in the appendix.
- Include a section describing the work done by each member of the group.
- You can use any programming language to do the project. MATLAB is preferred.

Report Guidelines

1. The Cover page identifies the course number and name, the Project number, team name, group member's names, and the report delivery date.
2. Make sure all steps in the assignment are followed.
3. Use words/sample_code to describe the procedures (How you did it). Explain the steps taken if needed.
4. Show and evaluate the results. Use words to describe the results and provide explanations if needed.
5. Number all the images/figures with captions. Refer to these images/figures in the write-up.
6. Number all pages of your report.
7. Neatness and a professional presentation count!

Warm Ups

Part 1

- Spend some time getting to know your team members. Exchange contact info. Discuss time to work on the project together after the class.
- ~~Create a name for your group.~~
- Take a group picture (needed for Part A).

Part 2

Spend some time playing with MATLAB, reading/watching the tutorials, and exploring Image Processing Toolbox. Use the following help commands

>> help *function_name* (try *size, length, sum, max, min, find, ones, zeros, imread, imshow, imhist,* etc.)

Part A

Use two images for the following steps. One is the group picture you just took. For the second one, find a landscape image from the Internet (the image should be of at least 800x600 pixels).

1. Read and display the image.
2. Convert the image to grayscale image (In MATLAB use rgb2gray()).

3. Find the maximum and minimum intensity values in the grayscale image, and their corresponding spatial coordinates. If multiple locations are found, you only need to show one spatial location.
4. Record the size of the grayscale image file in bytes and note the quality of the image; consider the overall scene and small details.
5. *Write your own code* to reduce the resolution of the original grayscale image. Display the image and note the image quality. Determine the lowest resolution that allows acceptable viewing. Record and compare the size of this image to that of the original image.

Part B

The main goal of this assignment is to determine the number and area of the bacteria in the given grayscale image (electronic version of the image can be found on Canvas).

1. Apply a threshold to the image to separate the bacteria from the background. Display the grayscale image and the binary image. Compute the total area of the bacteria in the image.
2. Label pixels belonging to each bacterium with a unique label. Display the labeled image.
3. Compute the area of each bacterium in the binary image. Would you say all the bacteria belong to the same family?