

Work in pairs. Loneliness kills. There are others out there who are struggling. Find someone and work together. Submit paired homework with one last name. You are BOTH responsible for understanding everything your team submits. Go the three people if you cannot find anyone else to work with.

At the top of your write-up, let me know who worked in your team.

How to submit your homework:

- A. Create a directory named HW04_Lastname_Firstname.
- B. Put everything in that directory: code, and PDF of your write-up.
- C. Zip up the entire directory, and submit it to the dropbox.

Remember to submit your programs, and a PDF write-up of what you did, all combined into one single ZIP file describing the results of your experiments. The grader and /or professor might run your code, or might just read your write-up. Be sure that both your code and your write-ups show good documentation practices and **correct English in complete sentences**. Even in your comments.

1. **As Usual:**

- a. As usual create a one main routine, HW_04_Lastname_Firstname.
- b. Add the directories ../TEST_IMAGES/ and ../TEST_IMAGES/ to the path.

c. **Document the code and what it does.**

In fact in this assignment, documentation is the main assignment. In industry, you will be given someone else's code, and they will not be from RIT, and know to document their code. We have had some of our RIT students get jobs because when they took the coding challenge for the companies, they documented their thought process as they were solving the problems. Other applicants wrote more code, but did not document it. Documentation is important to professors, and to industry.

Instead of hoping you figure out the correct code, I'm giving you the code.

Your job is look up all of the functions in the documentation, and add comments about what the code is doing, and why. You should understand the code well enough that you could reproduce it, and/or explain it on a quiz. This code demonstrates many Matlab functions.

- d. If this code still uses the old `histc()` function. Change the code to use and updated function. Use the documentation.
- e. Submit your commented code back to the dropbox.
- f. Submit a separate write-up named HW04_SomeLastName_FirstName.pdf, discussing what you observed and learned.

Write up:

2. **Write up the following information:**

- a. Change the name of the file to use the correct file name.
- b. Make sure that the code runs on your computer, and that you have all the images downloaded.
- c. Document the code, so that you can remember what it does when you study from it.
- d. The processing deletes some information before displaying the images. Does it allow you to identify the images? Could you still tell what was in the image?
- e. What information is being removed before the edge images are displayed?
- f. What do you observe about the resulting images?
- g. Are there any edges that you would expect to see that are not showing up? In particular, in the Camo Failure image, are there any missing lines?
- h. Why do you think the edges of the Road Home show up so well?

- i. Are there any missing edges you would expect to see around the infinity symbol in the image with the orange balloon at infinity?
- j. Could you read all of the text information in the images? Was some of the text more difficult to read than others?
- k. The code runs twice over each image. What does it do differently the second time through?
- l. What general shape do you notice about the histogram that results from this processing?
(Hint: see the Wikipedia page on the Rayleigh distribution. Where does that come from?)
- m. Do some images generate different shaped histograms? (Be sure to watch the histograms, and not just the images.)
- n. What does the magenta line on the histogram represent? What is to the left or right of the line?
- o. Do any edges show up on the kite that you would not expect to see?
- p. In my original idea for this homework, you would set the fraction of the edges to reject for each image. Each image has more or less “edginess” too it. Instead, I set the constant fraction of 0.95. Change this value to 0.75. What differences do you see?
- q. Change the constant fraction to a value of 0.98. What difference do you see?
- r. List new Matlab functions you learned about. These include `numel`, `histcounts`, `find`, and several others...

3. **Conclusions:**

Write a good conclusion about your learnings on this homework about cell arrays, and about the statistics of images. What did you do? What did you learn? This is a lab. The conclusion for your lab report are important. Show good evidence of learning. Feel free to incorporate example images or figures in your write-up to demonstrate your learnings. When the grader is in a hurry or pressed for time, the grader sometimes only reads your conclusion.