Using Your Mellon – For Segmentation

1. **Create a directory named   HW07__LastName__FirstName**
    Do all your work in that directory. Then, when you submit your work, zip up the entire directory (from the directory name on down). This way when it is unzipped after downloading from MyCourses, we will see 38 directories, with unique names that are easy to understand.

    Use the LastName that matches the last name assigned to you in MyCourses, and the first name assigned to you in MyCourses.

2. **Changing your path:**
    When you read in an image, such as the `cameraman.tif` image, Matlab searches your **path**. The path is a list of executable directories. To make life easy for the grader, you are going to put your test images in a standard location, and change your **path** to include that directory.
    a. Put our images in a directory that at the same level as the directory HW07__LastName__FirstName, and name this directory `TEST_IMAGES`.
    b. In your programs, change the path to include this location using the command:
        `addpath( '../TEST_IMAGES' );`
    c. Do not re-submit the test images. The grader will have copies of them.

3. Write one function that runs your entire image chain. The grader is going to run your program given a filename of an image. The image is similar to the ones provided for you to use as a test case. However, the image will be different. There may be a different number of pieces of melon there, but the camera and the lighting will be the same. The orientation of the pieces of melon will be the same – with the flesh of the melon always on the right of the skin.

    a. The function is to be in a file named `HWNN_Lastname_Firstname_MAIN.m`
        Where NN is the homework number. In this case 07.

    b. This function will:
        I. Display the image.

        II. Print out "There are 6 pieces of melon", with the correct number of the number of pieces of melon in the image.

        III. For each section of melon, draw a magenta line between the skin and the flesh – where the laser would cut if this were a true application.

4. Remember to comment your code well to show that you understand it. Write your comments in your own words.
    Lack of comments will cost points. In addition to your code, submit a PDF write-up describing your image chain.
    The grader may just look at your code, or might just look at your write-up, or both.

5. **Discussion:**
    In your write-up, general discussion is good.   We are looking for evidence that you understand the approach to what you are doing.   In this case either matching a model of an object, or avoiding a model of the background, or splitting an object into parts.

    Some students have been doing the bare minimum, such as answering questions with "no" or "see code."
    Or they answer only the questions suggested in the homework. The grader is free to assign a minimum grade to such answers.

    Imagine that you are doing this to explain it to next semester's class. Feel free to exceed expectations.

6. Estimate how long it will take to complete this assignment (½ pt)

7. **Requirements:**
   Professor Kinsman has a problem. He likes cantaloupe. Every morning he eats cantaloupe for breakfast. Monday, Tuesday, Wednesday, Thursday, Friday, Saturday and Sunday. Sometimes twice on Sunday.

   This means that every morning he has to cut the skin off of his cantaloupe. Sometimes twice on Sunday.

   He slices the cantaloupe and puts it on a cutting board so that the skin is always on the left, and the flesh is on the right.

   He has a camera rigged up to take pictures of the cantaloupe. All images you get will come from the same camera. The cantaloupe will always be on the same colored cutting board.

   So, given some examples of the images, you should be able to build a computer vision algorithm that tells the difference between the slices and the flesh. Then the computer vision algorithm will have to guide a carbon dioxide laser to cut the skin off the flesh of the melon.

8. **Your Tasks – Counting: (3)**

   Using techniques covered in class, or in the board, counter the number of slices of melon on the cutting board.

   Hint – you probably want to have this run in a separate function that returns the an indication of the number of pieces of melon, or their location(s) in the image.

9. **Your Tasks – Edge Identification for Cutting: (3)**

   Develop an algorithm, using the concepts you have learned in class, that draws a magenta line between the skin and the flesh on each slice of melon – where the laser would cut if this were a true application.

   Again, a separate file and function for this would be a good idea – given a sub-section of the image, and other parameters, find the melon.

10. Report how long it took you to complete the homework. This is for you to practice estimating, so be honest. (½ pt)

11. **What to Submit:**

    A PDF write-up, describe your imaging chain for parts 8 and 9. (3)
    This PDF should describe the algorithm(s) you used completely.

    Submit your code.

    All files should start with the prefix "`HW07_Lastname_Firstname_`" and be in one directory named HW07_Lastname_Firstname.

    Zip up the entire directory so that when it is unzipped it is a directory. **Test** your zip file to be sure it unzips to a directory and not into a set of files.

    The grader will run your homework file HW07_Lastname_Firstname_MAIN(filename) on an image that is similar to the images provided for testing, but not one of the test images.

12. **Other hints:**
    I recommend looking at all provided images when developing your algorithm(s).