

Homework 1

Computer Vision, Spring 2021

Due Date: February 8, 2021

Total Points: 7

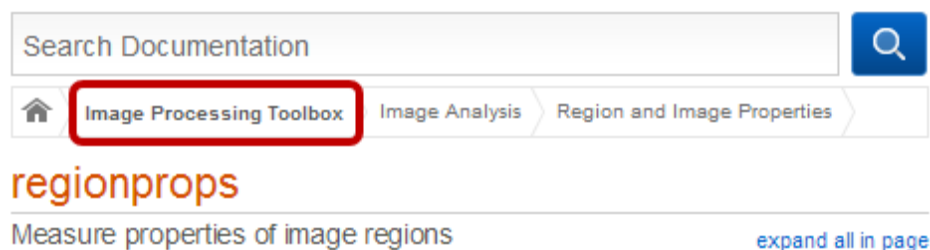
Note 1: There will be a total of 7 homeworks. All homeworks together will account for 60% of your final grade. Some homeworks are lighter than others; their relative weights in your final homework grade are determined by the total number of points listed at the top.

Note 2: There will be two types of problems in homeworks: **programming walkthroughs** and **programming challenges**. A homework may or may not contain both types of problems. Below is a brief description of each problem type.

Programming Walkthrough: These are “lightweight” programming assignments, which essentially walk you through partially complete code and ask you to fill in the missing segments. These assignments are designed with the following two goals: 1) to help you get started with MATLAB (if you are not yet familiar with it), 2) to demonstrate some of the important concepts discussed in class in MATLAB.

Programming Challenge: These are programming challenges to solve a variety of computer vision tasks using MATLAB. In most cases a testing framework or skeleton code will be provided. Your submitted code must work with these.

For all programming walkthroughs and challenges, **you may not use any functions from MATLAB’s Image Processing or Computer Vision toolboxes**, except for functions that are explicitly permitted. To check if a particular function is from one of these toolboxes, type `doc function_name` into the Command Window to view the function’s documentation. At the very top of the documentation window, the source of the function will be listed. For example:



In addition, the usage of one or more **specific built-in MATLAB commands may be barred**. Special instructions regarding allowed or disallowed functions will be explicitly stated in the description of each programming problem. You are required to submit the completed code and the generated outputs for both programming walkthroughs and challenges. Follow the separate document titled “**Guidelines for Programming Assignments**” for programming guidelines and submission information.

The goal of this programming assignment is to get you started with MATLAB for image processing and computer vision. The accompanying MATLAB script **runHw1.m** contains instructions and partially complete code to illustrate some of the basic concepts of MATLAB. Your tasks are to fill in the incomplete code, and to generate the results by executing the script. Include both the completed script and the outputs in your submission.

Walkthrough 1: Go through this brief introduction of MATLAB [1]. Have fun experimenting with different commands. Additional tutorials can be found here [2] [3], and on Canvas under the “Modules” tab. You are not required to submit any code for this Walkthrough 1. **(0 points)**

Walkthrough 2: Fill in the missing parts in **hw1_walkthrough2.m** to read an image and generate a 2x2 collage as shown below. The four patches of the collage are the original image and its red, green and blue channels. Submit both the completed script and the output. **(3 points)**



Input [4]



Output

Walkthrough 3: Complete **hw1_walkthrough3.m** to superimpose the “I Love NY” logo on top of a Manhattan scene. **Image Processing Toolbox functions permitted: im2bw, imresize.** **(4 points)**



Inputs [5] [6]



Output

References and Image Credits

- [1] MATLAB Introduction (UCSD). [Online].
<http://cseweb.ucsd.edu/~sjb/classes/matlab/matlab.intro.html>
- [2] MATLAB Documentation Center. [Online].
<http://www.mathworks.com/help/documentation-center.html>
- [3] MATLAB Tutorials. [Online].
http://www.mathworks.com/academia/student_center/tutorials/launchpad.html
- [4] [Online]. http://en.wikipedia.org/wiki/File:SelbstPortrait_VG2.jpg
- [5] I Love New York logo. [Online].
[http://en.wikipedia.org/wiki/File:I Love New York.svg](http://en.wikipedia.org/wiki/File:I_Love_New_York.svg)
- [6] Ruben Moreno Montoliu. [Online].
<http://www.flickr.com/photos/ruben3d/4392232665/>