CS376: Computer Vision: Assignment 0
Due: Jan. 29th, 11:59 PM

1   Introduction

We will use Matlab as the programming platform for doing assignments in this class. The goal of this warm-up problem set is to become familiar with basic Matlab commands, practice manipulating vectors and matrices, and try out basic image display and plotting functions. If you are unsure what a function does, at the command line, type 'help' and then the command name.

2   Using Matlab [50 points]

2.1   Getting Started

Read over the provided Matlab introduction code and its comments. Open an interactive session in Matlab and test the commands by typing them at the prompt. (Skip this step if you are already familiar with Matlab.)

2.2   Simple Functions

Describe (in words where appropriate) the result of each of the following Matlab commands. Use the help command as needed, but try to determine the output without entering the commands into Matlab. Do not submit a screenshot of the result of typing these commands.

- $>>$ I = eye(10);

- $>>$ A = [zeros(2,2), rand(2,2)]; a = A(:,2);

- $>>$ b = reshape(ones(10,1)*ones(1,10), [1,100]);

- $>>$ a = sort(rand(1,100)); b = a([end:-1:1]);

- $>>$ [u,v,w] = svd(rand(3,3));

3   Short Programming Example [50 points]

Write functions to do each of the following to an input **color** image, and then write a script that loads an image, applies each transformation to the original image, and displays the results in a figure using the Matlab subplot function. Label each subplot with title. Apply the script to an image(s) of your choosing, and show us the results.

- map a color image into a grayscale image.

- map the resulting grayscale image to its "negative image", in which the lightest values appear dark and vice versa.

- map the image to its "mirror image", i.e., flipping it left to right.

- Swap the red and green channels of the input color image and reduce the intensity of the red channel by half.

- add or subtract a random value between [0,255] to every pixel in the grayscale image, then clip the resulting image to have a minimum value of 0 and a maximum value of 255.

- In the grayscale image, find all the pixels whose intensities equal to 128. Plot these pixels.

Matlab tips: Do the necessary typecasting (uint8 and double) when working with or displaying the images. Some useful functions:title, subplot, imshow, mean, imread. Again, try to avoid using loops.

4   Submission Instructions

4.1   What to submit

- Your responses and code snippets for Part I

- Documented code for Part II, and a screenshot of the results with your image(s)

4.2   How to submit

electronically on Canvas:

- Compress all the files (code, writeup with images) into a zip file

- Log into Canvas

- Click "Assignments" on the left, and select the appropriate assignment

- Upload the zip file