

CMSC 426, Image Processing

HomeWork 0: Pin It!

Due on: 11:59:59AM on Tuesday, Sept 06 2016

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1 Problem Statement

You are given an image of colored objects a white background (Check file named `TestImgResized.jpg`). Your task is to segment out the objects, count the number of colored objects and also count the objects of the same color, i.e., green, blue, yellow and red. To have some fun, we also threw in a white object and a transparent object (we really want you to try to get these as well to make your fundamentals stronger).

2 Functions you are allowed to use

Any built-in MATLAB function **except the colorThresholder App** (<http://www.mathworks.com/help/images/ref/colorthresholder-app.html>). If you have a doubt whether a function can be used or not e-mail Nitin at nitinsan@terpmail.umd.edu.

3 Various Steps Involved

3.1 Denoise Images if needed - 10Pts

You can use any denoising filter like a gaussian or a median filter to ‘smooth out’ the image to reduce noise.

3.2 Find total number of colored objects (don’t worry about white and transparent pin) - 70Pts

You can use a combination of morphological operations and blob based properties (`regionprops`) to do this.

3.3 Find individual colored objects - Red, Green, Blue and Yellow - 20pts

Count and find individually red, green, blue and yellow objects. Use color information in any color space you want in conjunction with the previous step output to do this.

3.4 EXTRA CREDIT: Detect the white and transparent colored pins - 20pts

Do anything you want to find this. (If possible, avoid hard-coding the thresholds).

3.5 EXTRA CREDIT: Implement a simple 1D Gaussian to detect colored pins - 20pts

Follow points from the gaussian tutorial. You’ll need a 1D gaussian for each color.

3.6 EXTRA CREDIT: Implement a 3D Gaussian to detect colored pins - 20pts

Follow points from the gaussian tutorial. You'll need a 3D gaussian for each color.

3.7 EXTRA CREDIT: Implement a Gaussian Mixture model to detect any one of the colored pin - 100pts

Follow points from the gaussian tutorial. You'll need multiple 1D/3D gaussians for each color.

4 Submission Guidelines

Write a small (1-4 pages) report of your approach with input and output images after each step. Use red colored boxes for red objects, yellow colored boxes for yellow objects, blue colored boxes for blue colored objects green colored boxes for green objects and black colored boxes for white/transparent objects.

Submit your codes and report as a zip file with the naming convention **YourDirectoryID_hw0.zip** onto ELMS/Canvas.

5 Collaboration Policy

Feel free to discuss the ideas with any number of other people. But the code you turn-in should be your own and if you **DO USE** (try not it and it is not permitted) other external codes/codes from other students - do cite them. For other honor code refer to the CMSC426 Fall 2016 website.

DON'T FORGET TO HAVE FUN AND PLAY AROUND WITH IMAGES!.