LAB 1: Object Detection through Color Tracking

Due: Thursday, February 7th 2pm

The objective of the first lab is to write an algorithm to detect and contrast between colored cubes in images that were captured by the Cozmo robot. To be more specific, your algorithm should be able to detect the number of yellow and green cubes in an image while ignoring red cubes. You are provided with the following directory of files:

`color_cube_detection/`

- count_cubes.py - This is the main file where you will enter your solution. Complete the functions `filter_image()`, `detect_blob()` and `count_cubes()`. `filter_image()` will filter the image based on the color you pick. `detect_blob()` will detect the number of blobs in a filtered image. `count_cubes()` will return the number of yellow cubes and green cubes in the image respectively. You may edit any part of this file and add helper functions as needed, but make sure your code is self-contained because this is the only file that you will be submitting.

- `autograder.py` - this autograder is provided to help you verify your solution. We will be using the same autograder with a new set of images to verify your solution.

- `data/` - directory containing a set of captured images and a text file listing the true number of yellow and green cubes respectively in each image.

Lab Checkpoint [10 points]: Complete the installation of Python 3 and the Python 3 version of OpenCV. Instructions can on Blackboard.

Main Lab [90 points]: Complete the code to detect and count the number of yellow and green cubes in each image via `count_cubes()` which calls `filter_image()` and `detect_blob()`.

Evaluation: We will evaluate the performance of your algorithm on 100 images using the autograder. 50 of these images will be the same as the ones you are provided with the assignment, and 50 will be new images taken under the same conditions. Your grade will be determined as the percentage of the images in which the number of yellow and green cubes is correctly reported.

Submission: By 2pm on Thursday February 7th 2019, submit **only** `count_cubes.py` on Blackboard. Make sure your code is entirely contained within this file. If you relied significantly on any external resources to complete the lab, please reference them in the submission comments.

Note: This lab is to be done **individually** and similar submissions will be detected as **plagiarism**.