

CS 309

Autonomous Intelligent Robotics (FRI I)

HW 3: ROS Basics and Some Simple Computer Vision Due: March 26, 2019

You can find the latest version of this PDF at
http://justinhart.net/files/homework/2019_spring_cs309/HW3/hw3.pdf

You can find the rosbag used in this homework at
http://justinhart.net/files/bags/three_cups.bag

Your implementation should compile using `catkin_make` or `catkin build` with `g++` under ROS Kinetic and Ubuntu 16.04.

- In class, we learned how to extract an image of a blue cup from a rosbag using OpenCV. That rosbag can be found at the URL above. In the video in that bag, there are 3 cups. Your job is to stream a ROS topic that shows only those three cups, but shows all three cups. To do so, you will modify the code example from that lecture, which can be found in the examples on justinhart.net. Your code should:
 - Extract the blue cup using color subtraction and thresholding methods as outlined in class. It should use color channel subtraction, thresholding, contour detection, and masking to perform this task. Comments are not mandatory, but may help the TA evaluate your solution if it only partially works.
 - The “blue cup” should be the largest region of the blue cup as determined by `findContours()`. You do not need to grab the bit of the stem that is severed when my hand occludes part of the blob. What I mean by this will become obvious when you have gotten that far.
 - Repeat this for the green and red cups.
- Publish a rostopic for each cup. Each of these rostopics must be viewable in rviz and should use `cv_bridge`.
 - `/color_filter/blue_cup`
 - `/color_filter/green_cup`
 - `/color_filter/red_cup`
- Next, create a topic that has all 3 cups in one image. `bitwise_or()` can help you do this
 - `/color_filter/cups`
- Your solution should stream these topics so that they can be viewed as a video in rviz.