

CS519 Fall 2017 - Assignment 2

Total points: 100

Due date: Monday, November 20, 2017

1. Hough Transform for Line and Circle Detection

For the given pool table image, write a program that detects pool table and balls using Hough Transform.

- a. (15 pts) Generate an image showing detected lines (show four main lines like the following result) of the pool table overlaid on the top of the original image.



- b. (10 pts) Generate an image showing detected balls overlaid on the top of the original image.
- c. (Extra 15 pts) Compute and generate an image showing the location of **four corners of the pool table** overlaid on the top of the original image.

2. Image Pyramids

(30 pts) Write a program that performs image blending based on image pyramids. In this task, feel free to choose a pair of images and a mask of your choice. The resulting images showing the blending like the following. (Hint: please use the formula in our slides of Lecture 5)



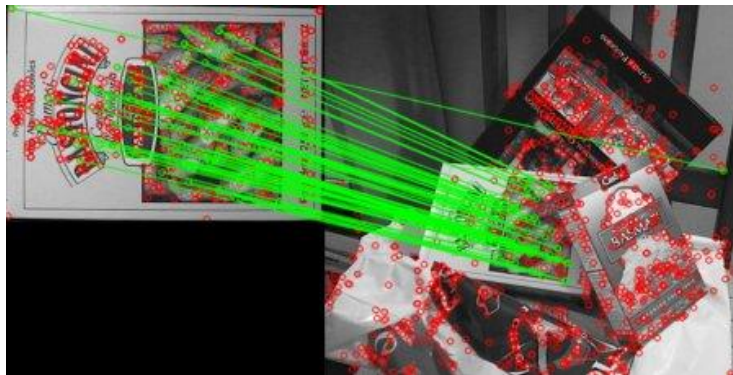
3. Image Segmentation

Write a program that performs image segmentation. In this task, feel free to choose an image of your choice.

- (10 pts) Perform K-means based on intensity only, and compare with the one based on intensity and locations.
- (10 pts) Use mean-shift to perform image segmentation, and compare with the one using K-means. (You can use intensity or intensity and locations as feature information)

4. Keypoints and Descriptors

Write a program that extracts keypoints and uses them for image matching. The resulting images showing the matching like the following. In this task, feel free to choose images of your choice.



- (15 pts) Use SIFT features and descriptors.
- (10 pts) Use Oriented FAST and Rotated BRIEF (ORB). References:
 - http://opencv-python-tutroals.readthedocs.io/en/latest/py_tutorials/py_feature2d/py_orb/py_orb.html
 - http://www.willowgarage.com/sites/default/files/orb_final.pdf

What to Submit?

1. Python source codes for each task (Please comment each line)
2. Input images of each task
3. Output images of each task
4. Readme.txt (Please describe how to run your code)
5. Please zip all documents as yourname_lab2.zip and submit it in blackboard.