

Assignment 2

April 5, 2011

The objective of this assignment is to work through background subtraction using the kinect. You are encouraged to look for outside sources and discuss the assignment with each other, but should 1) acknowledge people you work with and sources you consult for the assignment, and 2) do your own programming and writeup (expect for part 4). Hand in your assignment including code and writeup in an email to aberg@cs.stonybrook.edu with “cs 527 assignment 1” in the subject by midnight on February 18. Remember to include your name.

Part 0

Read and understand:

<http://research.engineering.wustl.edu/~pless/papers/cvprInd.pdf>

Part 1

Collect a sequence of 100 frames from the kinect using the depth sensor and the color imager. The scene should not be boring in terms of depth or color, but should be more or less stationary and contain no moving people. Do pre-processing to throw out “out-of-range” data and compute means and standard deviations for each pixel. Visualize all of these for both depth and color images including legends to make the values in your images clear.

Part 2

Collect 2 sequences of 100 frames each of the same scene as used above. For the first sequence have one person moving in front of the camera (left to right), for the second, have two people moving in front of the camera, one left to right, the other right to left. Do change detection using a Gaussian mixture model according to the paper – using a collection of features (intensities, gradients, and optical flow) and show your results for some frames. Try to represent the success and failures of the approach. Write up the techniques you actually use. Don't forget to include where you acquired the code for optical flow and fitting a mixture of Gaussians.

Part 3

Collect another pair of 100 frame sequences, one of the stationary scene, and another of a person moving through the stationary scene. For both sequences make sure to gently tap the kinect repeatedly during acquisition in order to generate camera shake. Use the same change detection technique as above, and show some results. Can you do anything to improve results in the presence of camera shake?

Part 4

Make an interactive demonstration of background subtraction. You should be able to start the kinect, record some background (for a few seconds) and then have the system only show the parts of each frame that are significantly different from the background model. You should be able to demonstrate this in class, and for this part of the homework you can produce only a single version for your whole group.