Homework Assignment #4

DUE: 5:00pm, Sunday April 24th (Electronic turnin required)

You are to implement a stereo reconstruction program. Your program takes two photos, which are assumed to be in the "standard" stereo configuration, i.e., the photos were taken by placing two identical cameras side-by-side with their optical axes pointing in parallel and perpendicular to the baseline. With the standard stereo configuration, epipolar lines correspond to the image scan lines. So your program needs to handle only a pair of corresponding scan lines from the left and right images at a time. You apply the same scan-line stereo matching algorithm over all the scan lines to build a complete 2D disparity map.

You can find many such datasets with ground-truth disparity maps at http://vision.middlebury.edu/stereo/data/

Your main Matlab code must be called "stereo.m" and should accept two filenames: left and right images, a disparity scale factor, and the name of the output disparity map. If a pixel's disparity cannot be determined because of occlusion, that pixel should be colored black (0). Otherwise, the grayscale values should correspond to disparity (closer objects with larger disparities are brighter). Disparities are encoded using the scale factor specified in the input for gray levels [1..255]. For example, a grayscale value of 100 with a scale factor of 8 means that the corresponding pixel is 100/8=12.5 pixels to the left. Please check Middleburry Website to see how to map disparity values to intensity values as different datasets may use different scale factors.

There are hundreds of stereo matching algorithms reported in literature. So you do not have to implement the ones that I discussed in class (e.g., plan-sweep algorithms are acceptable too). You should include a README file to let the reader know which algorithms you use (please cite academic references).