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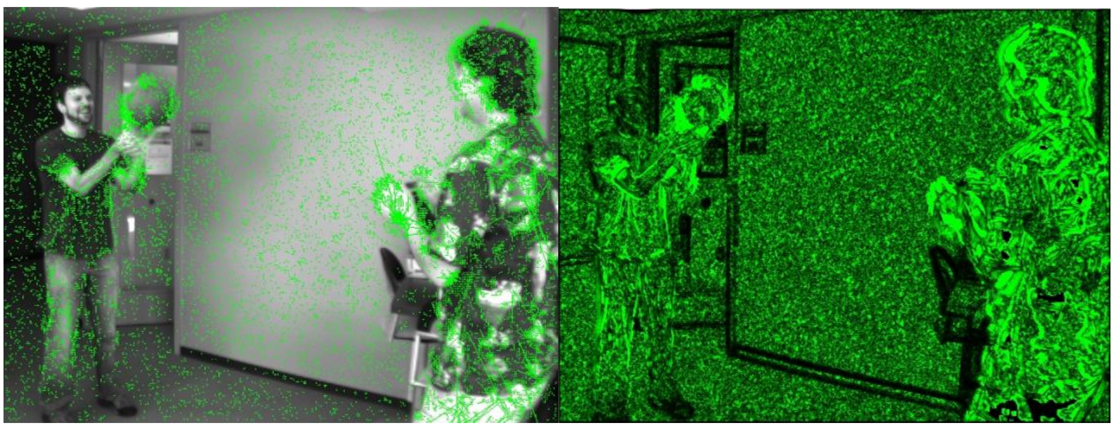
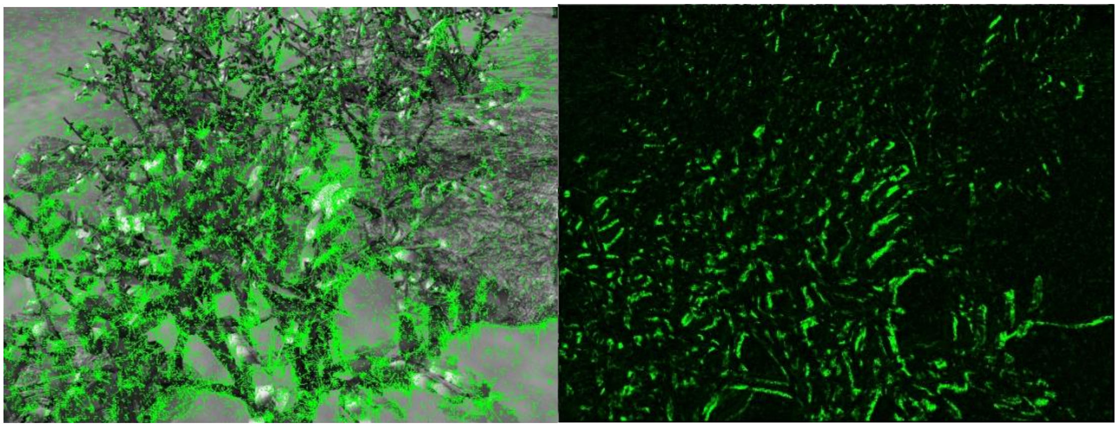
Computer Vision
Program 2 Writeup

Program two covered the use of the optical flow algorithm. The goal of the optical flow algorithm is to essentially detect motion between two or more image frames. In order to get the building blocks for the algorithm I calculated the derivative of gaussion in the x and y for both images as well as the sobel filters. The DoG vectors for image one were used as 'A' in the OLS algorithm. I_t was the difference of the two applied sobel images. This was enough to calculate the optical flow vectors using the equation (vx,vy) = (ATA)^-1 * I_t.



The image on the left demonstrates motion detected for each person, with a threshold set on the minimum magnitude of the vectors to be plotted. In addition points were plotted between separate runs as either 2,3, or 4 pixel grids.

The image on the right is an intensity map based on the magnitude of each vector for every point on the image. Bright green shows the strongest response, and black the weakest. In order to attain these results the magnitudes were multiplied by 255 and set as the green value for each point on the plot. Using 255 as a baseline it's possible to change the upper threshold of what gets clipped, for example multiplying the magnitudes by 255 will necessarily clip anything over that as pure bright green, whereas adding a .5 multiplier to 255 will double the clipping range to magnitudes of 2. This was necessary because a large number of image pixels have very small magnitude, and without amplification would generate a black image as they approach 0 on a 255 image scale.



This set of images proved more difficult to create a visualization for that made sense, however the movement, and therefore magnitude in this image has a stronger baseline than the previous which required further work. While the initial plotted image was black like the previous, multiplying the magnitude for the right image by (255/10) and setting it to the green channel produced good results where it’s possible to decipher the objects, and where movement is. The left image required plotting vectors at every two pixels and thresholding at a magnitude of .8.