Austin Lawrence, EECS-432, 2/3/2015

Lucas-Kanade and Horn-Schunck Optical Flow

Both the Lucas-Kanade and Horn-Schunck methods are coded using OpenCV for convenient image processing functions. The optical flow algorithms themselves are coded explicitly for this assignment.

Lucas Kanade Results

This particular algorithm uses a brute-force method to evaluate the entire Gaussian-smoothed image in small kernel intervals for optical flow. For a faster code, it would be desired to limit evaluation to a finite number of edges, which contain enough information to avoid the aperture problem.

The results below demonstrate optical flow vectors observed for a given image sequence. Optical flow appears reasonable for the sphere, though both the office and rubic images seem very susceptible to noise. A 7x7 gaussian smoothing filter was used:
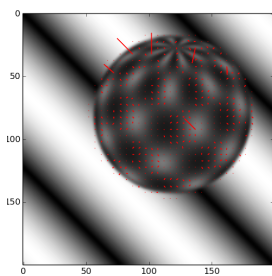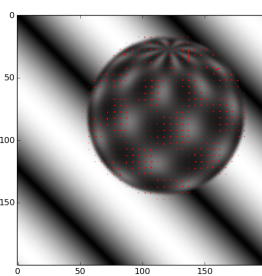

Figure 1 – W/ Gaus. Weight
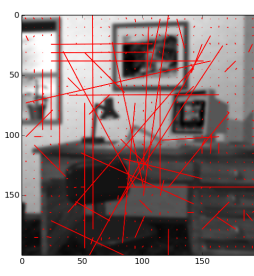

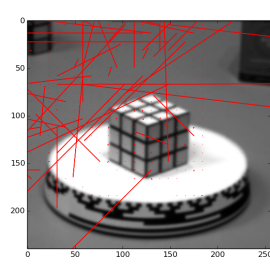Figure 2 – W/out Gaus. Weight

Figure 3 - Office LK

Figure 4 - Rubic LK

Horn-Schunck Results

The Horn-Schunck algorithm assumes uniform flow throughout the image and estimates velocity through an iterative approach. Because of this assumption, we no longer need to evaluate small kernels of the image under the assumption that optical flow is uniform within the cell. Results appear much more along the lines of what we would expect. Computing times are still too long for real-time control, reducing the image resolution is one potential solution to resolve this.
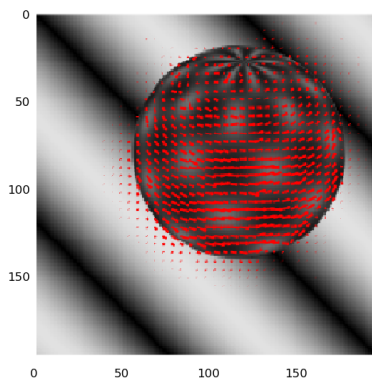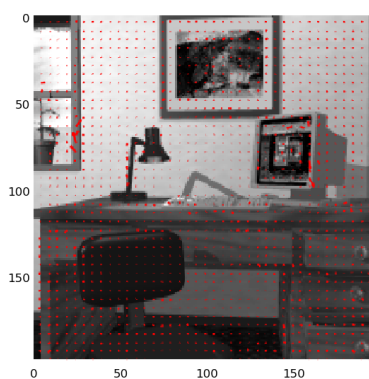

Figure 5 - Sphere HS
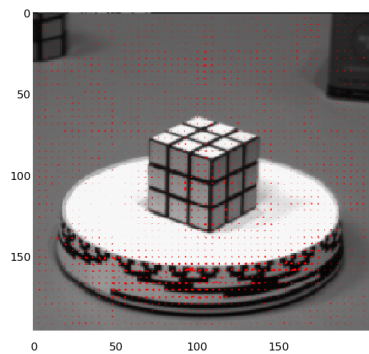

Figure 6 - Office HS

Figure 7 - Rubc HS