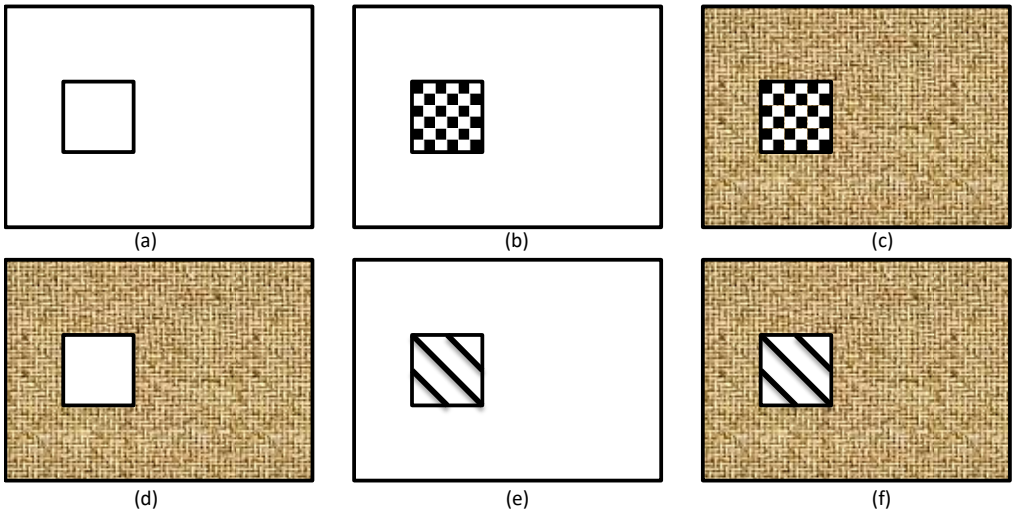
COMP70058 Computer Vision

Tutorial 7 - Motion and Optical Flow

1. Consider the following different scenarios when a square object is moving towards the upper right corner. Sketch out the detected optical flow directions at the object borders. The black lines around the object are just to highlight the boarder of the object and they are not part of it



2. Estimate the optical flow between the "Rubber Whale" frames from the middlebury optical flow dataset using the Lucas-Kanade method.

To solve the optical flow constraint equation, the Lucas-Kanade method divides the original image into smaller sections and assumes a constant velocity [u v] in each section. Then it performs a least-square fit of the optical flow constraint equation to a constant model for [u v] in each section. The method achieves this fit by minimizing the optical flow constraint equation. To implement the method the following steps can be executed:

1. Compute the image derivatives Ix and Iy using the kernel [−1 8 0 −8 1]/12 and its transposed form.
2. Compute the derivative It between images 1 and 2 using the [−1 1] kernel.
3. Smooth the gradient components, Ix, Iy, and It, using a 5-by-5 Gaussian kernel.
4. Solve the 2-by-2 linear equations for each pixel to find the least-squares solution.

Display the last image frame and plot the optical flow vectors as quiver plot. You can compare your estimated vectors with the ground truth optical flow using the code to read the flow data provide at https://vision.middlebury.edu/flow/data/.