

# Homework 3

## 16-720A Computer Vision

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October 25, 2017

### Q 1.3

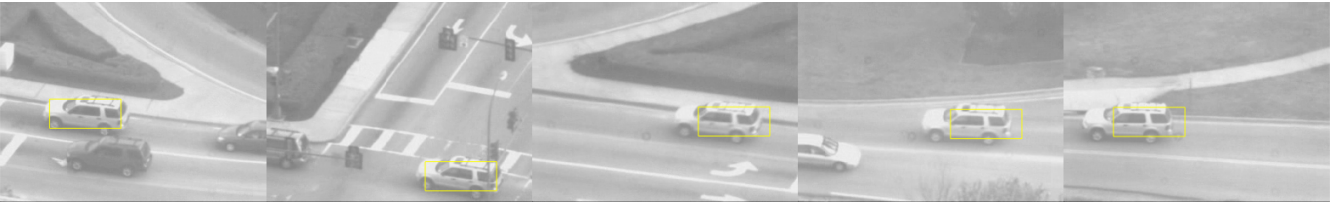


Figure 1: Basic Lucas-Kanade template tracking.

### Q 1.4

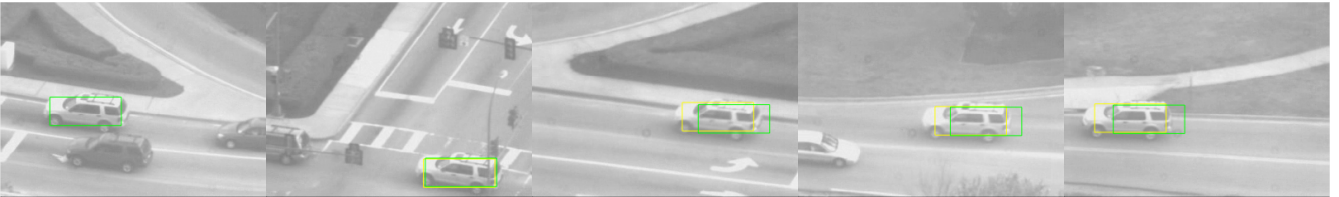


Figure 2: Lucas-Kanade template tracking with drift correction. The yellow boxes are the original Lucas-Kanade algorithm, the green boxes are the drift corrected version.

### Q 2.1

Given

$$\mathcal{I}_{t+1}(\mathbf{x}) = \mathcal{I}_t(\mathbf{x}) + \sum_{k=1}^K w_k \mathcal{B}_k(\mathbf{x})$$

we can find  $\mathbf{w}$ :

$$\mathbf{w} = (\mathcal{I}_{t+1}(\mathbf{x}) - \mathcal{I}_t(\mathbf{x})) [\{\mathcal{B}_k\}_{k=1}^K]^{-1}$$



Figure 3: Appearance basis tracking to more accurately track a template of Sylvester the cat. Yellow is the original Lucas-Kanade algorithm, green is the basis-corrected Lucas-Kanade algorithm. The basic algorithm performs well enough that there is little observable difference in this basic test.

### Q 3.3

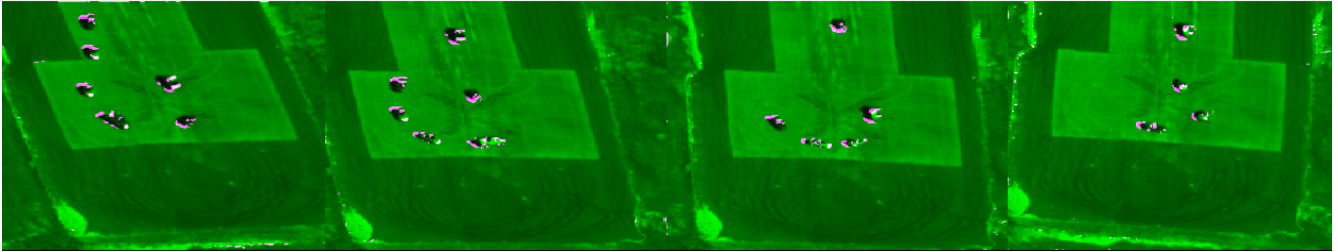


Figure 4: Dominant affine motion removal with Lucas-Kanade. The pink dots are what is actually moving in the ground plane.