

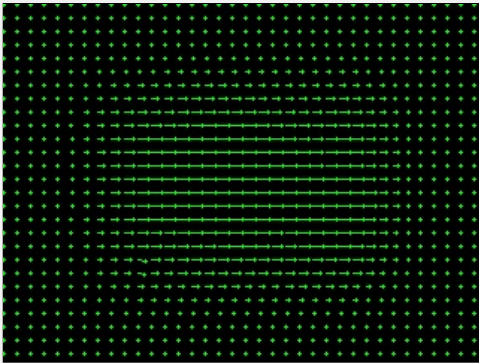
Computer Vision

Spring 2020

Problem Set #4

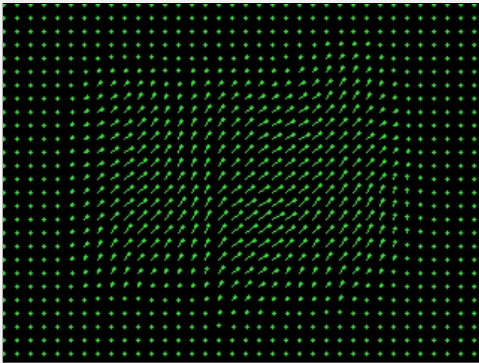
Andrew Parmar
aparmar32@gatech.edu

1a: Base Shift0 and ShiftR2



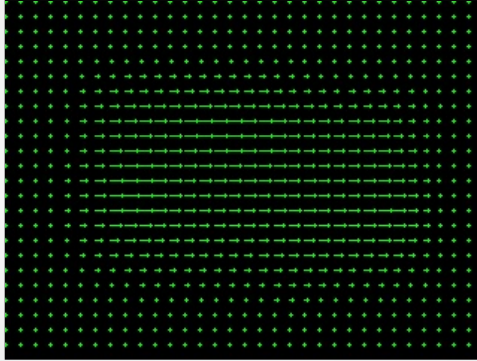
ps4-1-a-1

1a: Base Shift0 and ShiftR5U5



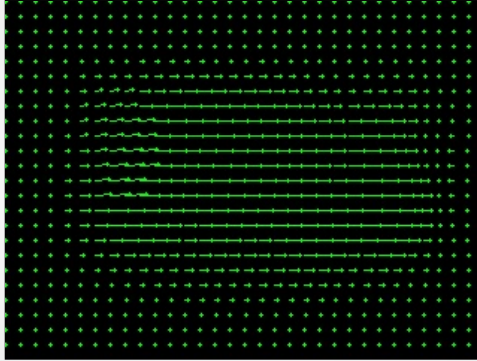
ps4-1-a-2

1b: Base Shift0 and ShiftR10



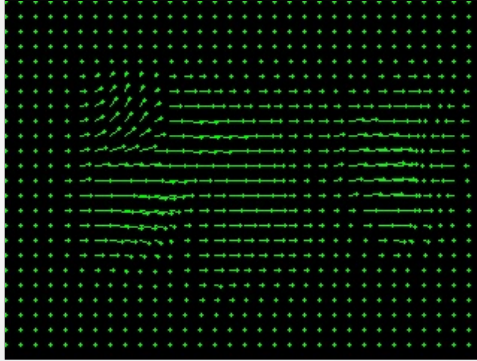
ps4-1-b-1

1b: Base Shift0 and ShiftR20



ps4-1-b-2

1b: Base Shift0 and ShiftR40



ps4-1-b-3

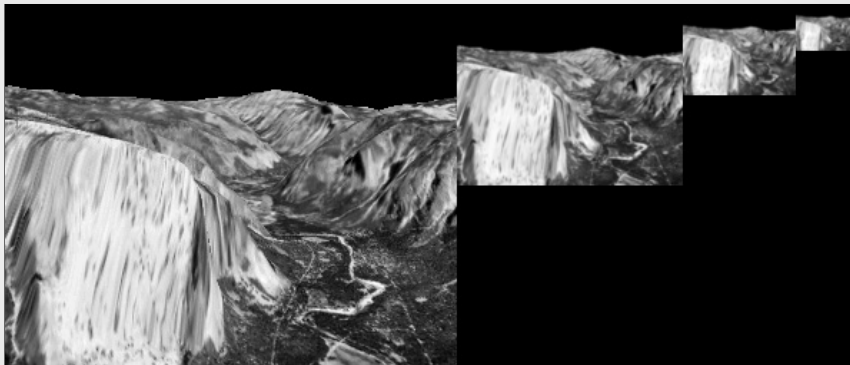
1b: Text Response

Does LK still work? Does it fall apart on any of the pairs? Try using different parameters to get results closer to the ones above.

Describe your results and what you tried.

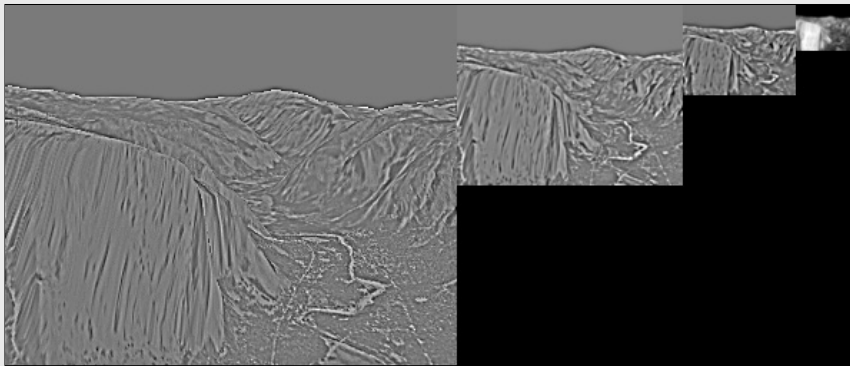
LK seems to start performing poorly for large displacements, and seems to get progressively worse the larger the displacement gets. This is expected as the Taylor series expansion for the solution to the brightness consistency constraint no longer holds for large displacement values. As only the first order Taylor expansion is used, the truncation errors will be now be large. My Lukas-Kanade optic flow implementation already included a derivative blurring step. This blur used a gaussian kernel. I had to double the sigmaX value for this kernel (double compared to part 1a) to generate a smoother quiver plot.

2a: Gaussian Pyramid



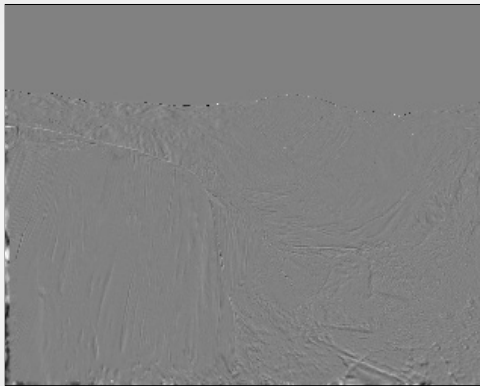
ps4-2-a-1

2b: Laplacian Pyramid



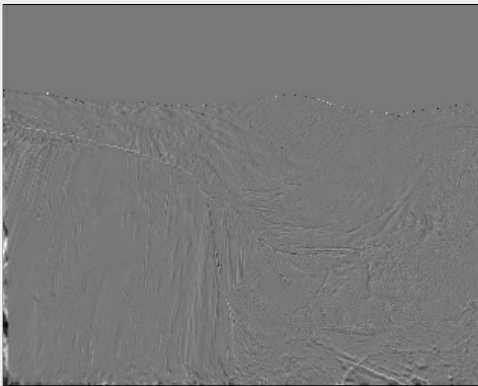
ps4-2-b-1

3a: Difference images



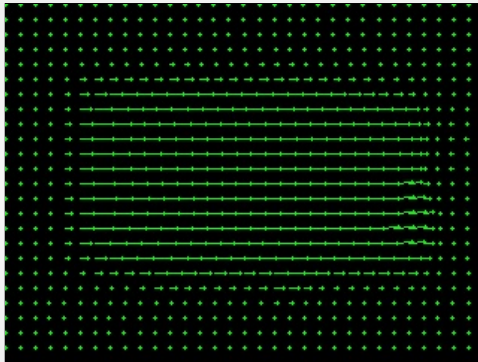
ps4-3-a-1

3a: Difference images (cont.)



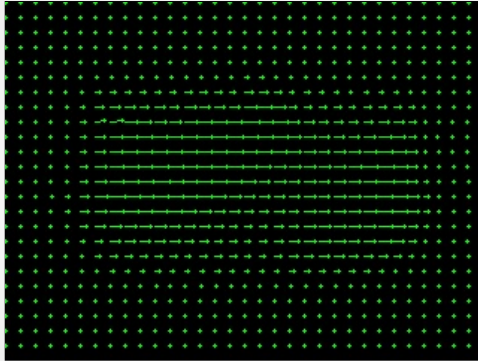
ps4-3-a-2

4a: Hierarchical LK



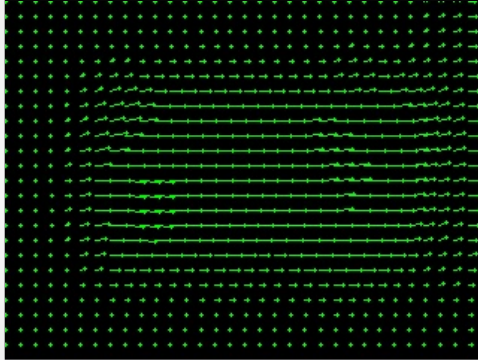
ps4-4-a-1

4a: Hierarchical LK (cont.)



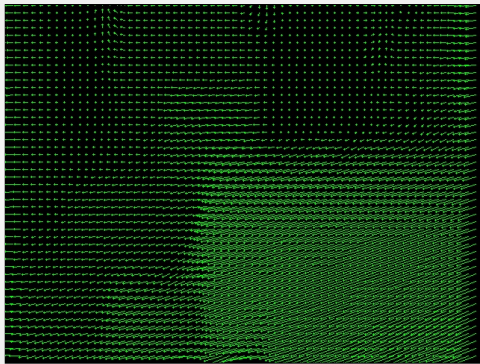
ps4-4-a-2

4a: Hierarchical LK (cont.)



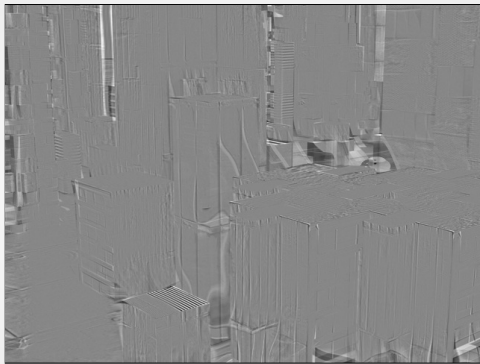
ps4-4-a-3

4b: Hierarchical LK (cont.)



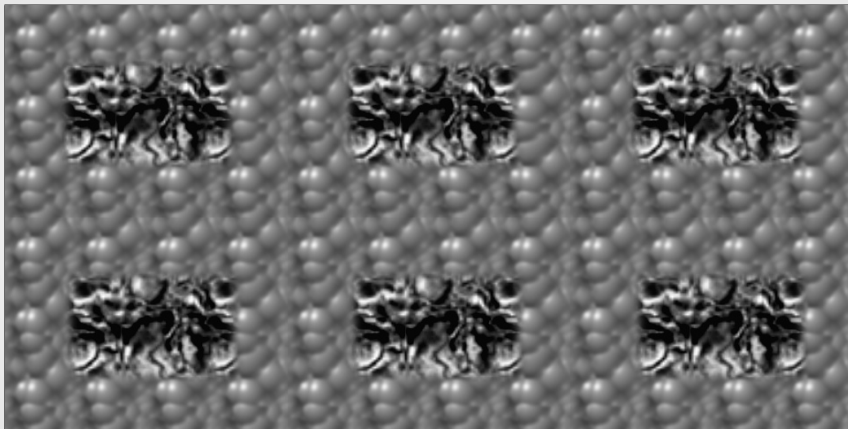
ps4-4-b-1

4b: Hierarchical LK (cont.)



ps4-4-b-2

5a: Frame Interpolation



ps4-5-a-1

5b: Frame Interpolation



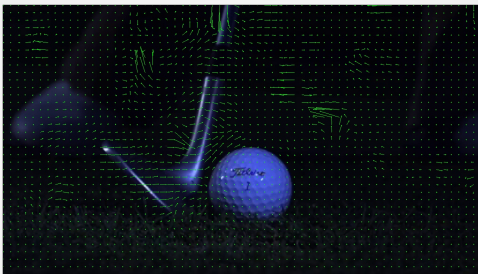
ps4-5-b-1

5b: Frame Interpolation



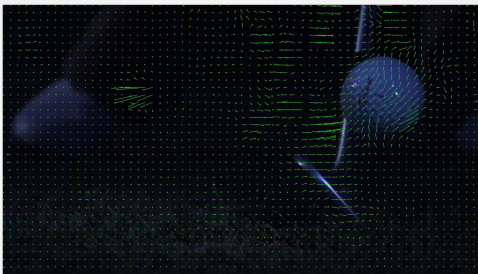
ps4-5-b-2

6: Challenge Problem



ps4-6-a-1

6: Challenge Problem (cont.)



ps4-6-a-2

6: Challenge Problem (cont.)

Video link:

https://youtu.be/QNr6ey_qVgA

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<https://smallpdf.com/compress-pdf>

Verify that all images are still visible for grading.