Computer Vision
Spring 2019
Problem Set #4

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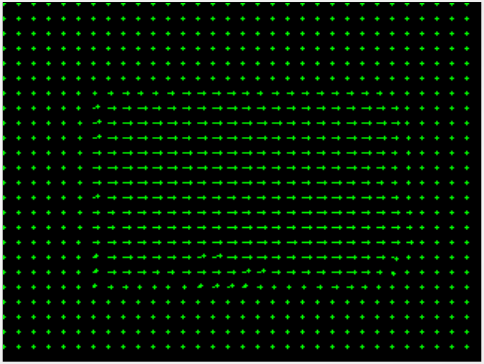
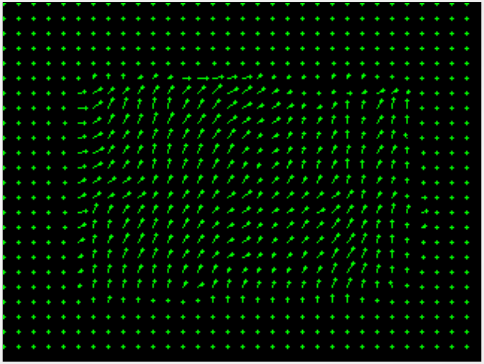
1a: Base Shift0 and ShiftR2



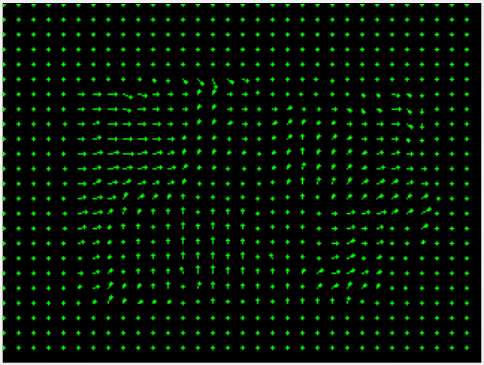
ps4-1-a-1

1a: Base Shift0 and ShiftR5U5



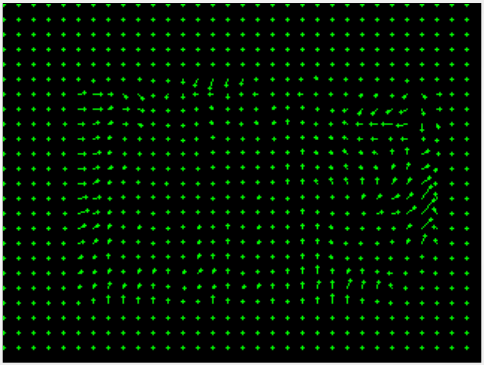
ps4-1-a-2

1b: Base Shift0 and ShiftR10



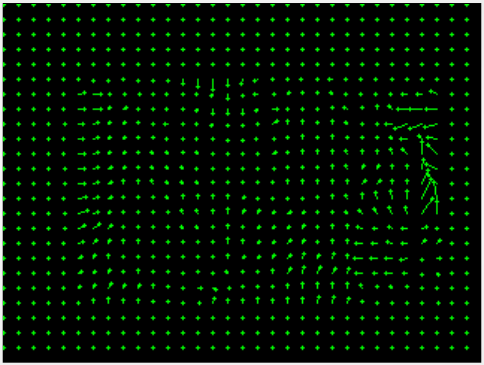
ps4-1-b-1

1b: Base Shift0 and ShiftR20



ps4-1-b-2

1b: Base Shift0 and ShiftR40



ps4-1-b-3

1b: Text Response

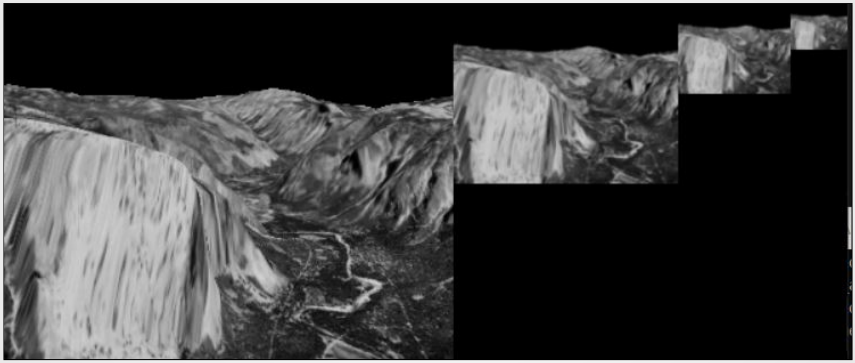
Does LK still work? Does it fall apart on any of the pairs? Try using different parameters to get results closer to the ones above.

Describe your results and what you tried.

My Lukas-Kanade algorithm does work very well on image pairs with a small displacement. The problem with a larger pixel displacement is that the Taylor series approximation does not hold for larger pixel deltas. When doing a Taylor series approximation, you are performing a first-order linear estimate on the image displacement, but when the displacement is large, that assumption no longer holds.

The Lukas-Kanade methods performs great with displacements of 5 and 2, but only okay (with hyperparameter tuning) on a displacement of 10. However, it performs poorly on displacements of 20 and 40.

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

Results goes here!

6: Challenge Problem (cont.)

Method used:

6: Challenge Problem (cont.)

Optical flow is only one approach to activity recognition and classification. Many modern methods do not require optical flow at all, but simply learn to classify actions directly from the pixels. Can you think of a situation in which calculating the optical flow would be a vital part of action classification? What about a situation in which optical flow might be unhelpful in action classification?

Your answer goes here!

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