Local All-Pass Filters for Optical Flow Estimation - Extra Material

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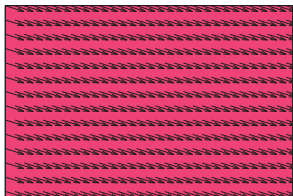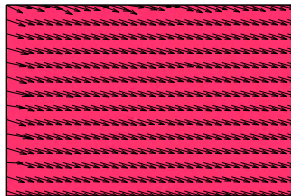The Chinese University of Hong Kong
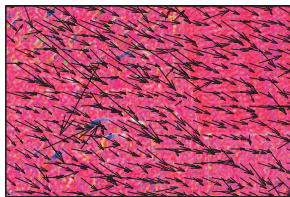

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Demonstrating LAP Consistency

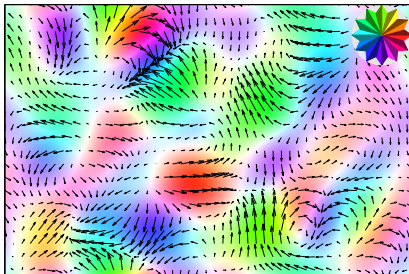(a) Constant Flow

(b) Raw LAP Estimate

(c) Lucas-Kanade
Estimate

Estimating a Smoothly Varying Optical Flow

Input Images (584 × 388 pixels)
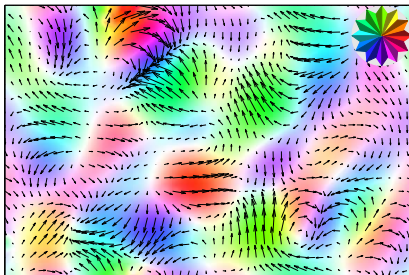
Synthetic Optical Flow

Maximum displacement of flow = 15 pixels

Estimating a Smoothly Varying Optical Flow

Image Interpolation using Flow:

LAP Estimate

Median EE $=$ 0.010 pixels and Median AE $=$ 0.072 degrees
Computation Time $=$ 6.23 seconds

Estimating a Smoothly Varying Optical Flow

Interpolation using LAP Estimate: Interpolation using HS Estimate:
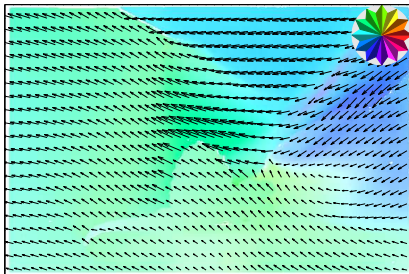
PSNR = 49.3dB   PSNR = 28.6dB

Real Conditions - Dimetrodon Images

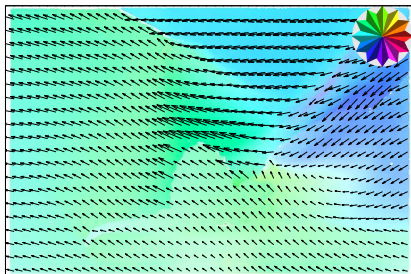Input Images (584 × 388 pixels)

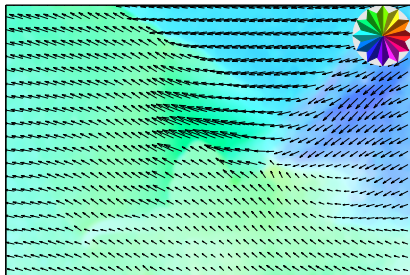Ground Truth Optical Flow:

Maximum displacement of flow = 4.67 pixels

Real Conditions - Dimetrodon Images

Ground Truth Optical Flow:

LAP Estimate:

Median EE $= 0.071$ pixels   and   Median AE $= 1.664$ degrees
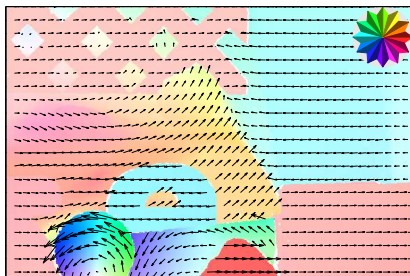Computation time $= 7.76$ seconds

Real Conditions - Dimetrodon Images

Interpolation using LAP Estimate, PSNR = 41.9dB

Real Conditions - RubberWhale Images

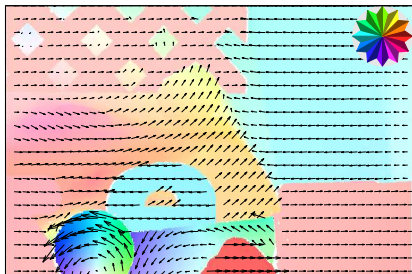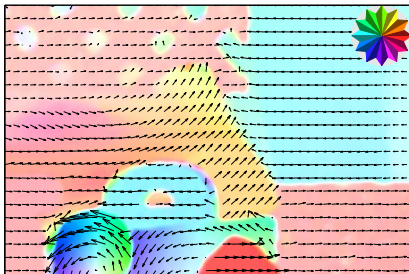Input Images (584 × 388 pixels)

Ground Truth Optical Flow:

Maximum displacement of flow = 4.62 pixels

Real Conditions - RubberWhale Images

Ground Truth Optical Flow:

LAP Estimate:

Median EE $= 0.039$ pixels and Median AE $= 1.512$ degrees
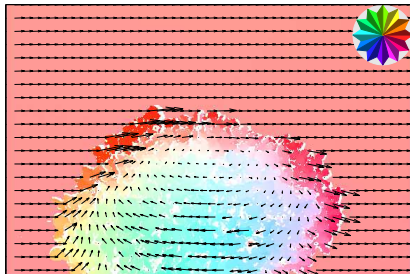Computation time $= 7.76$ seconds

Real Conditions - RubberWhale Images

Interpolation using LAP Estimate, PSNR = 41.9dB

Real Conditions - Hydrangea Images
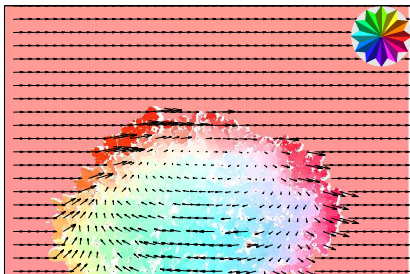
Input Images (584 $\times$ 388 pixels)

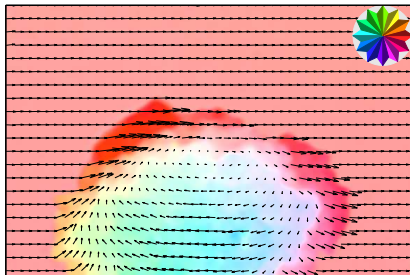Ground Truth Optical Flow:

Maximum displacement of flow $=$ 11.12 pixels

Real Conditions - Hydrangea Images

Ground Truth Optical Flow:

LAP Estimate:

Median EE = 0.050 pixels   and   Median AE = 0.386 degrees
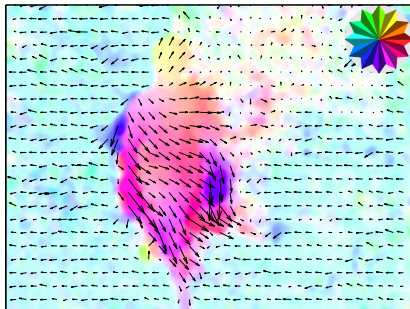Computation time = 8.03 seconds

Real Conditions - Hydrangea Images

Interpolation using LAP Estimate, PSNR = 31.8dB

Real Conditions - Walking Images

Input Images (640×480 pixels)

LAP Estimate of Optical Flow:

No ground truth flow $\implies$ Assess via image interpolation
Computation time $= 9.69$ seconds

Real Conditions - Walking Images

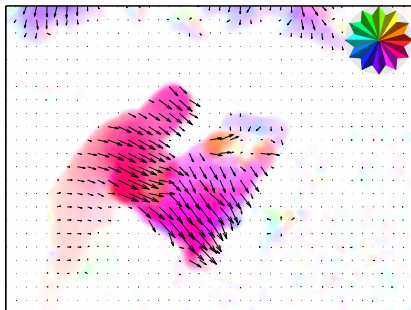Middle Image Interpolation using LAP Estimate, PSNR $=$ 37.4dB

Real Conditions - Walking Images

The result as a video

Real Conditions - MiniCooper Images

Input Images (640 × 480 pixels)   LAP Estimate of Optical Flow:

No ground truth flow $\implies$ Assess via image interpolation
Computation Time $=$ 9.81 seconds

Real Conditions - MiniCooper Images

Middle Image Interpolation using LAP Estimate, PSNR $= 32.7$dB

Real Conditions - MiniCooper Images

The result as a video