

# Resolution enhancement: example image processing flow Using high s/n dithered images

- No resolution enhancement
  - calibrate
  - align
  - stack (sigma-reject)
  - crop
  - stretch, curves
  - Finished
  - Upsize 800% for compare
- Enhanced resolution
  - calibrate
  - upsize 4x4
  - align
  - stack (sigma-reject)
  - crop
  - stretch, curves
  - Finished
  - Upsize 2x for compare

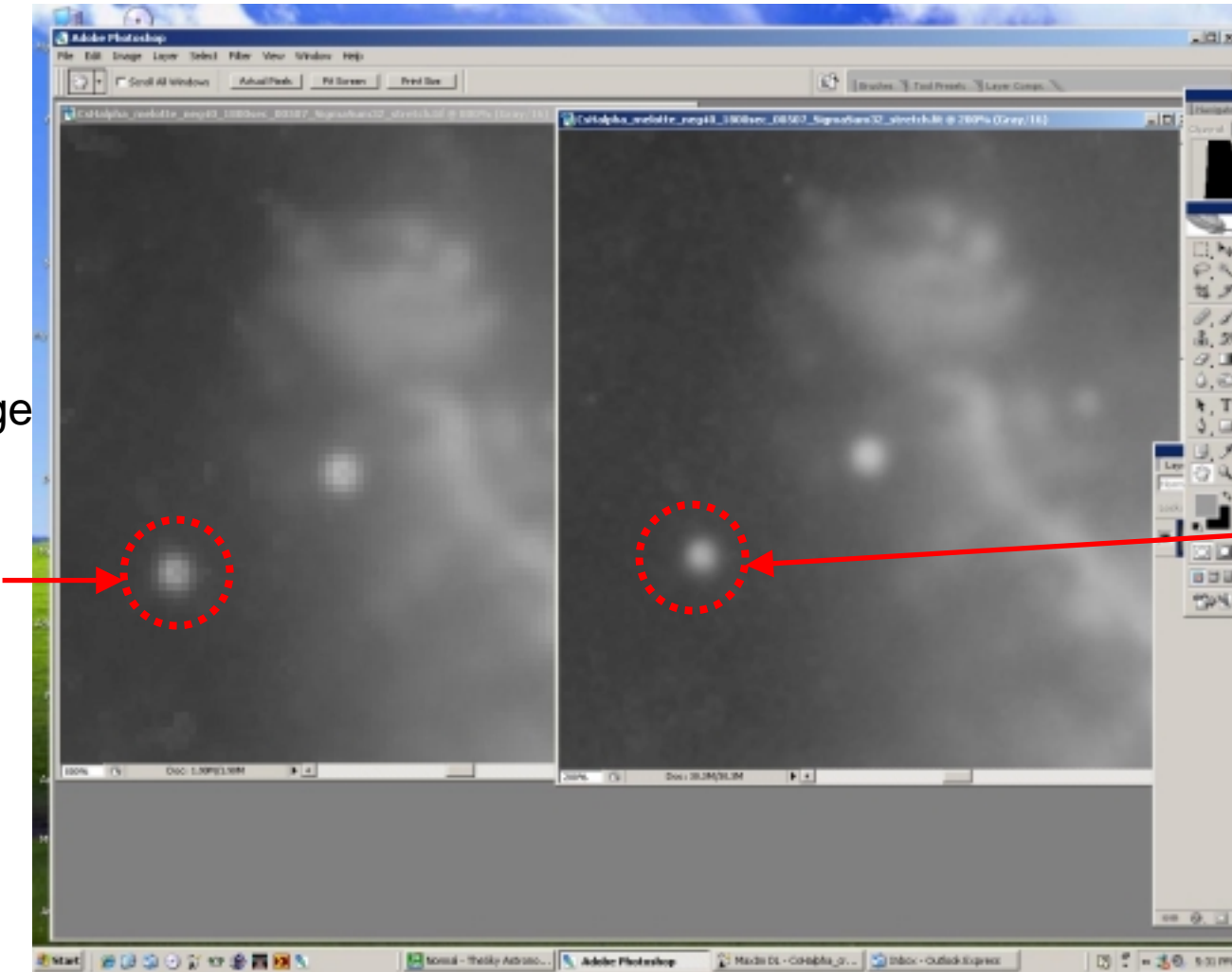
Both images compared at 800% per side from original  
Exposures (1K x 1K)

r. crisp 3/13/2007

# Example Resolution enhancement by stacking seven upsized and dithered images

800%  
non-upsized  
dithered image  
stacked

Note aliasing

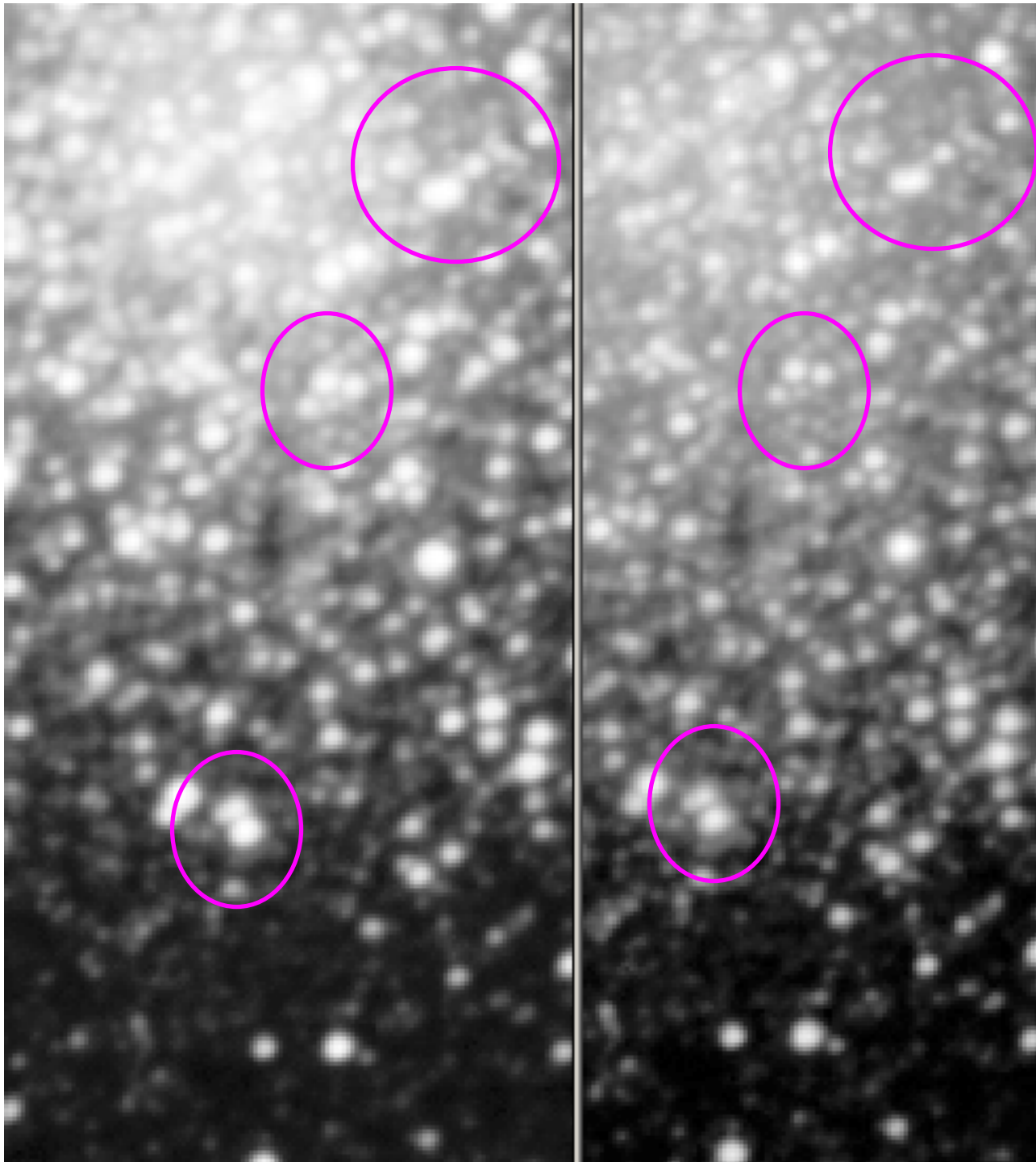


Resampled to  
400% before  
Registering and  
Stacking

Upsized 200%  
For compare

No aliasing

Bicubic interpolation used for resampling images for stacking



Better  
Definition  
Of tightly  
Spaced stars

Standard  
Combine

**Data/  
processing  
Courtesy  
Chris  
Abissi**

Resolution  
Enhanced

r.crisp  
08/27/2007

http://www.nato-us.org/imaging2006/papers/flusser2.pdf - Microsoft Internet Explorer

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### IMAGE FUSION

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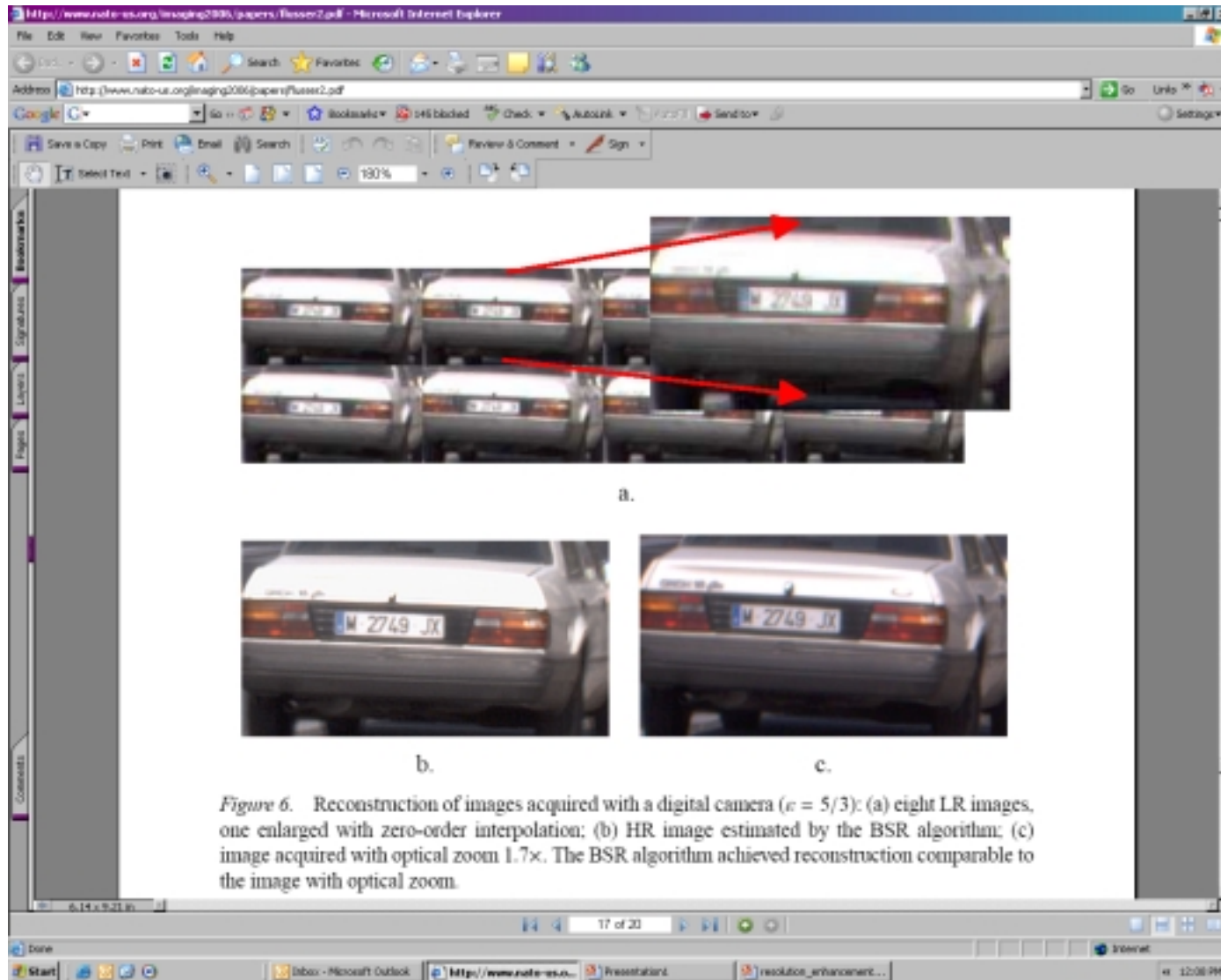
```
graph LR; A[Input Images] --> B[Registration]; B --> C[Image Fusion];
```

Figure 1. Image fusion in brief: Acquired images (left), registered frames (middle), fused image (right).

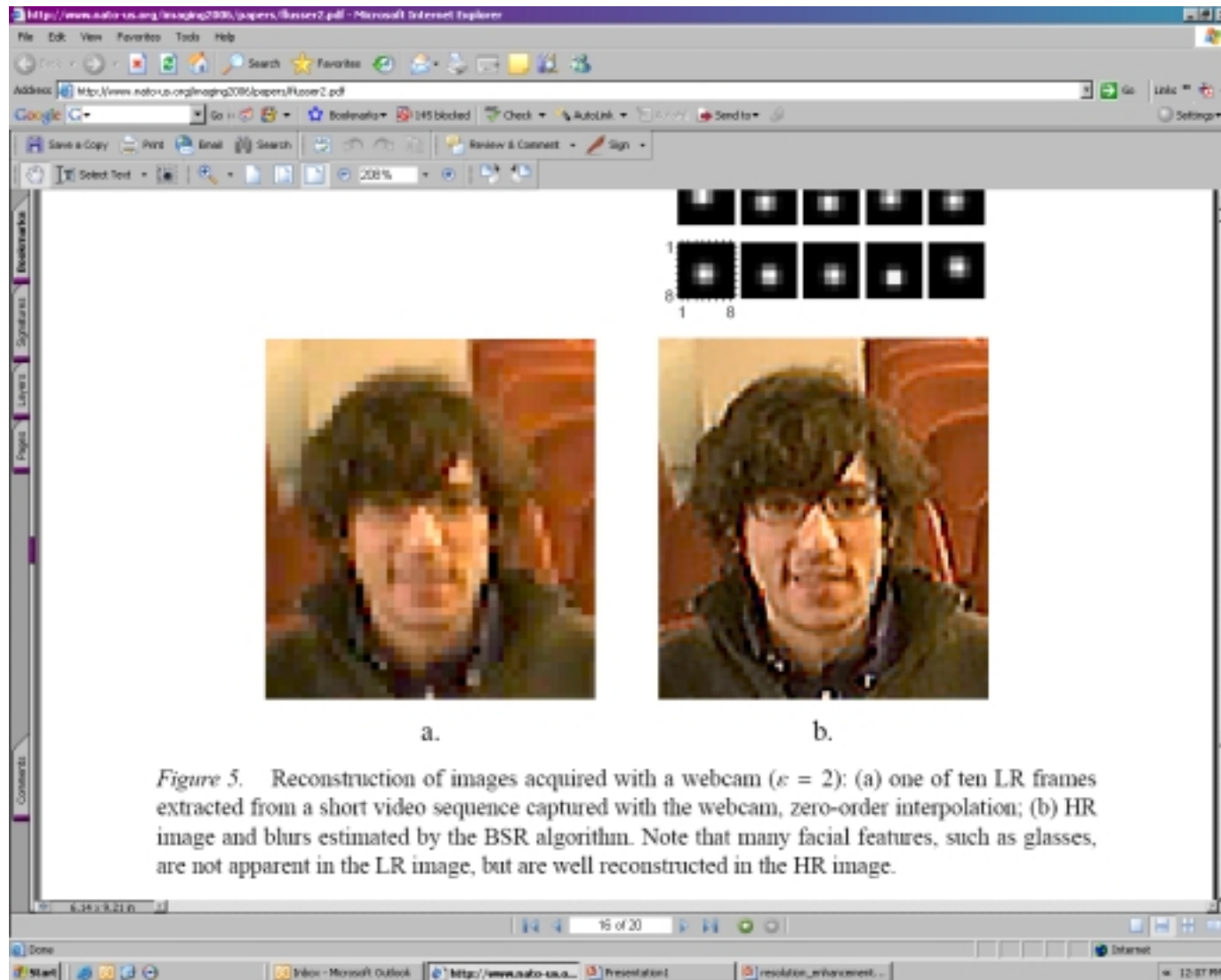
for geometric deformations  $W_k$ , followed by a *multichannel* (or *multiframe*) *blind*

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<http://www.nato-us.org/imaging2006/papers/flusser2.pdf>

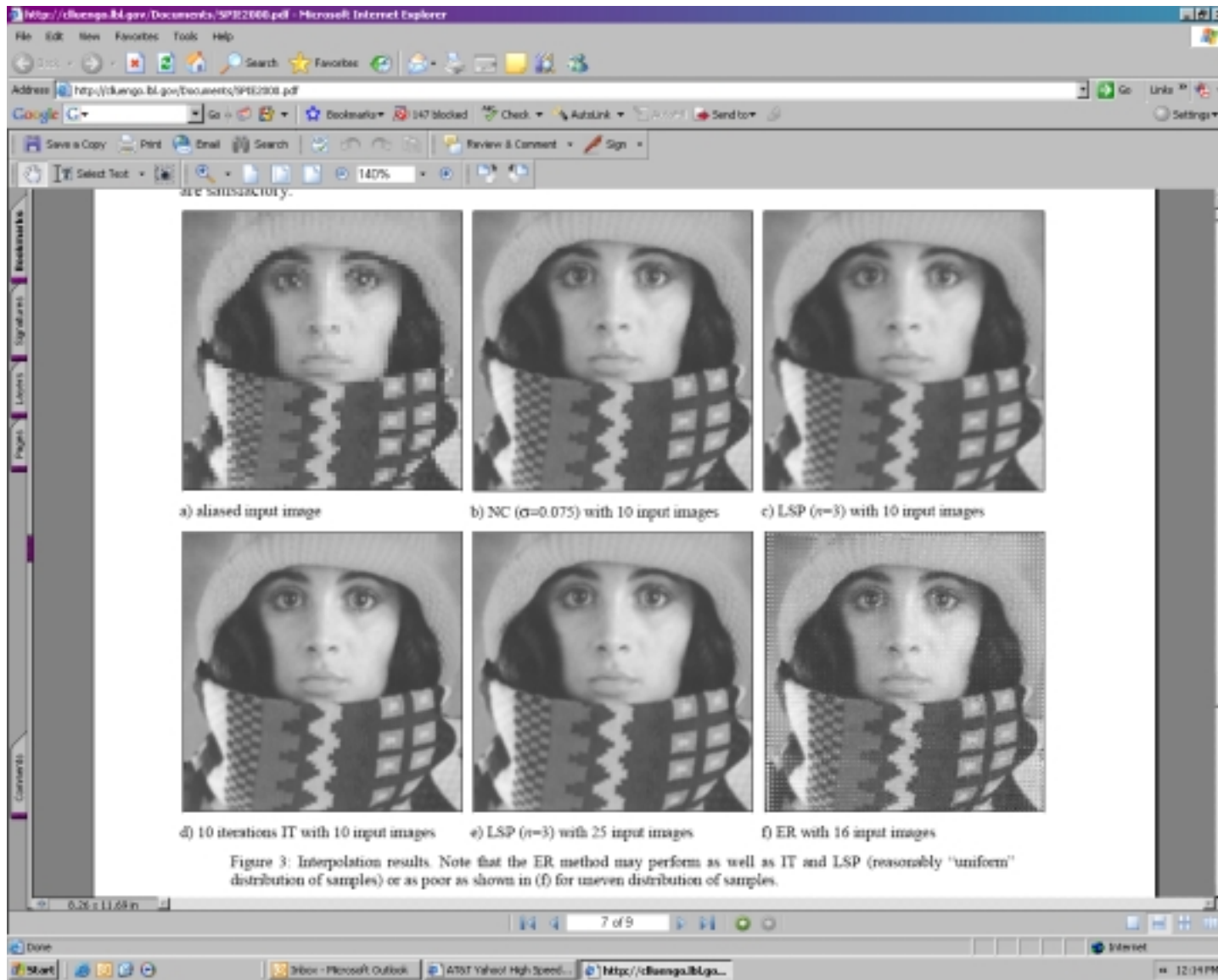


<http://www.nato-us.org/imaging2006/papers/flusser2.pdf>



*Figure 5.* Reconstruction of images acquired with a webcam ( $\varepsilon = 2$ ): (a) one of ten LR frames extracted from a short video sequence captured with the webcam, zero-order interpolation; (b) HR image and blurs estimated by the BSR algorithm. Note that many facial features, such as glasses, are not apparent in the LR image, but are well reconstructed in the HR image.

<http://www.nato-us.org/imaging2006/papers/flusser2.pdf>



<http://cluengo.lbl.gov/Documents/SPIE2000.pdf>