Lecture 15: Motion

Pyramids for large motion

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CS131 Computer Vision: Foundations and Applications

What will we learn today?

- Pyramids for large motion
  - Motivation
  - Method
  - Results

Recap

- Key assumptions (Errors in Lucas-Kanade)

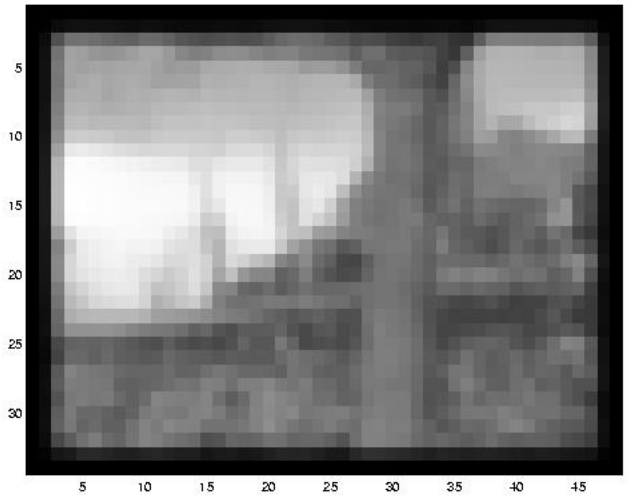
  - **Small motion:** points do not move very far
  - **Brightness constancy:** projection of the same point looks the same in every frame
  - **Spatial coherence:** points move like their neighbors

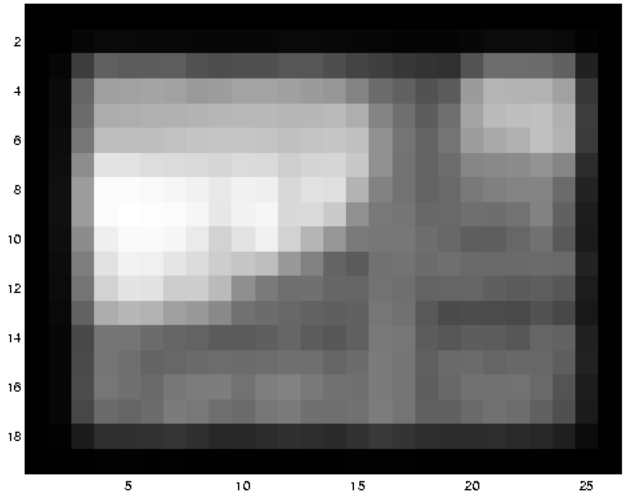
Source: Silvio Savarese

Revisiting the small motion assumption

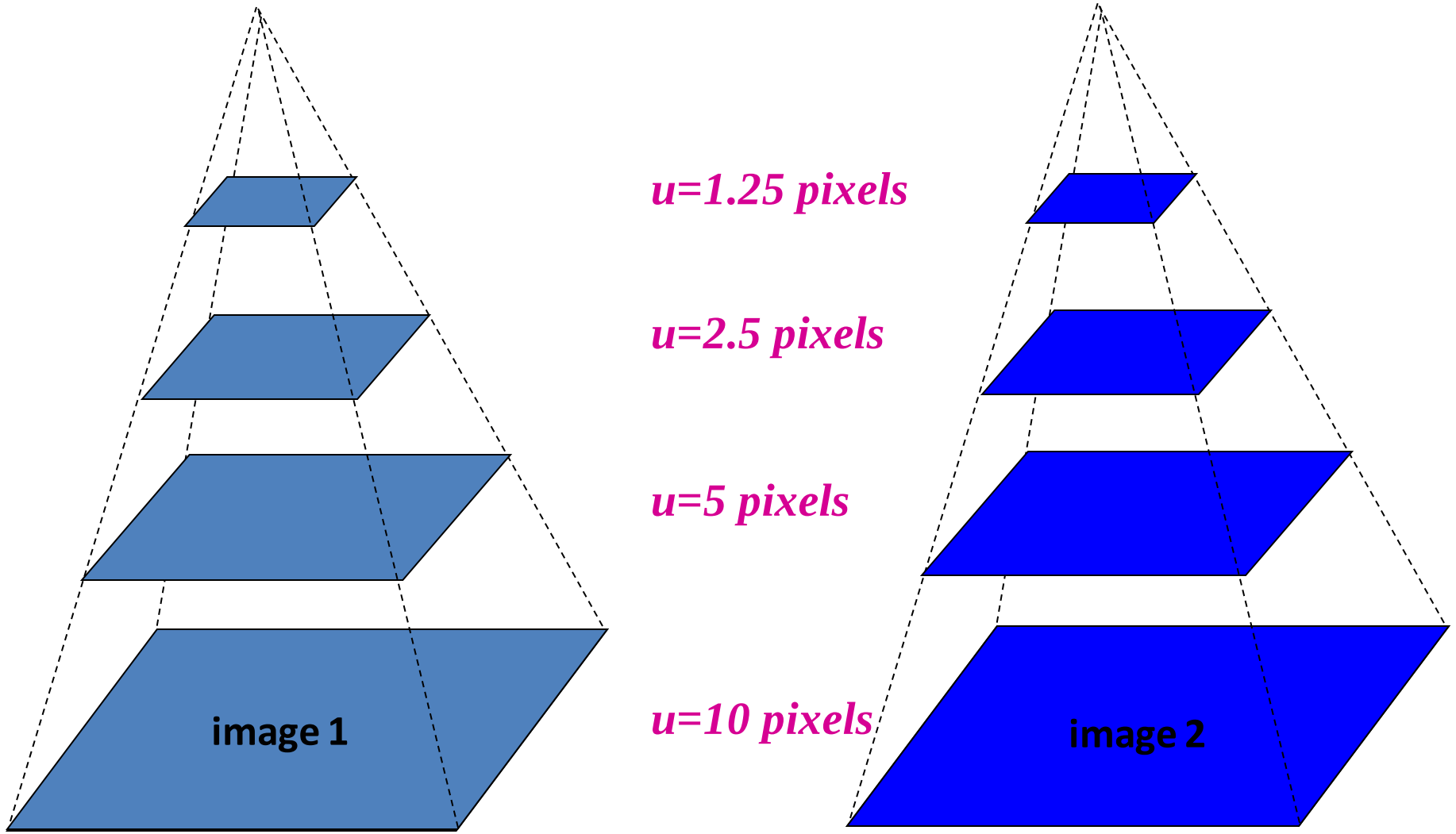
- Is this motion small enough?
  - Probably not—it's much larger than one pixel (2nd order terms dominate)
  - How might we solve this problem?

Reduce the resolution!





Coarse-to-fine optical flow estimation

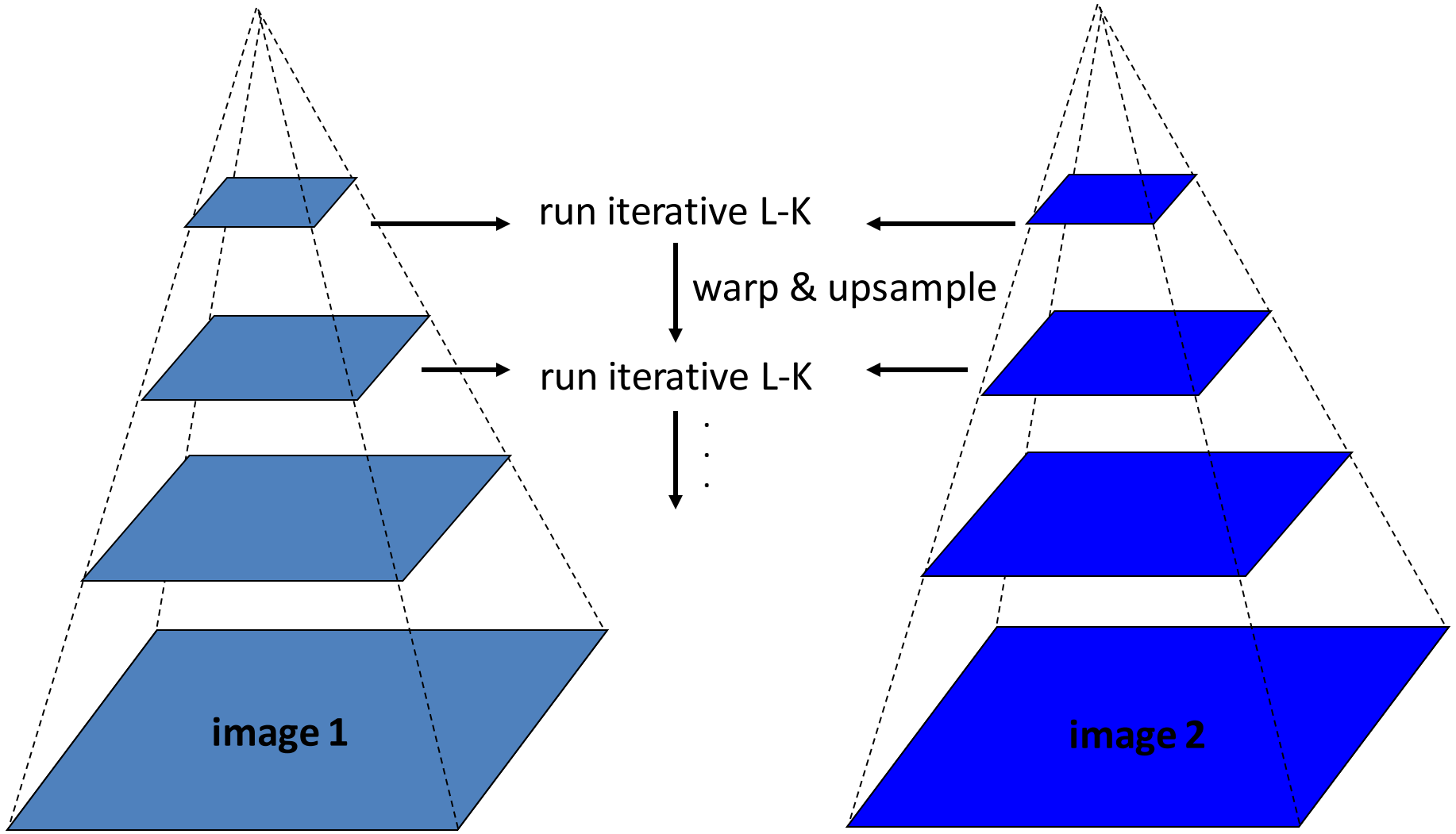


Gaussian pyramid of image 1 (t)

Gaussian pyramid of image 2 (t+1)

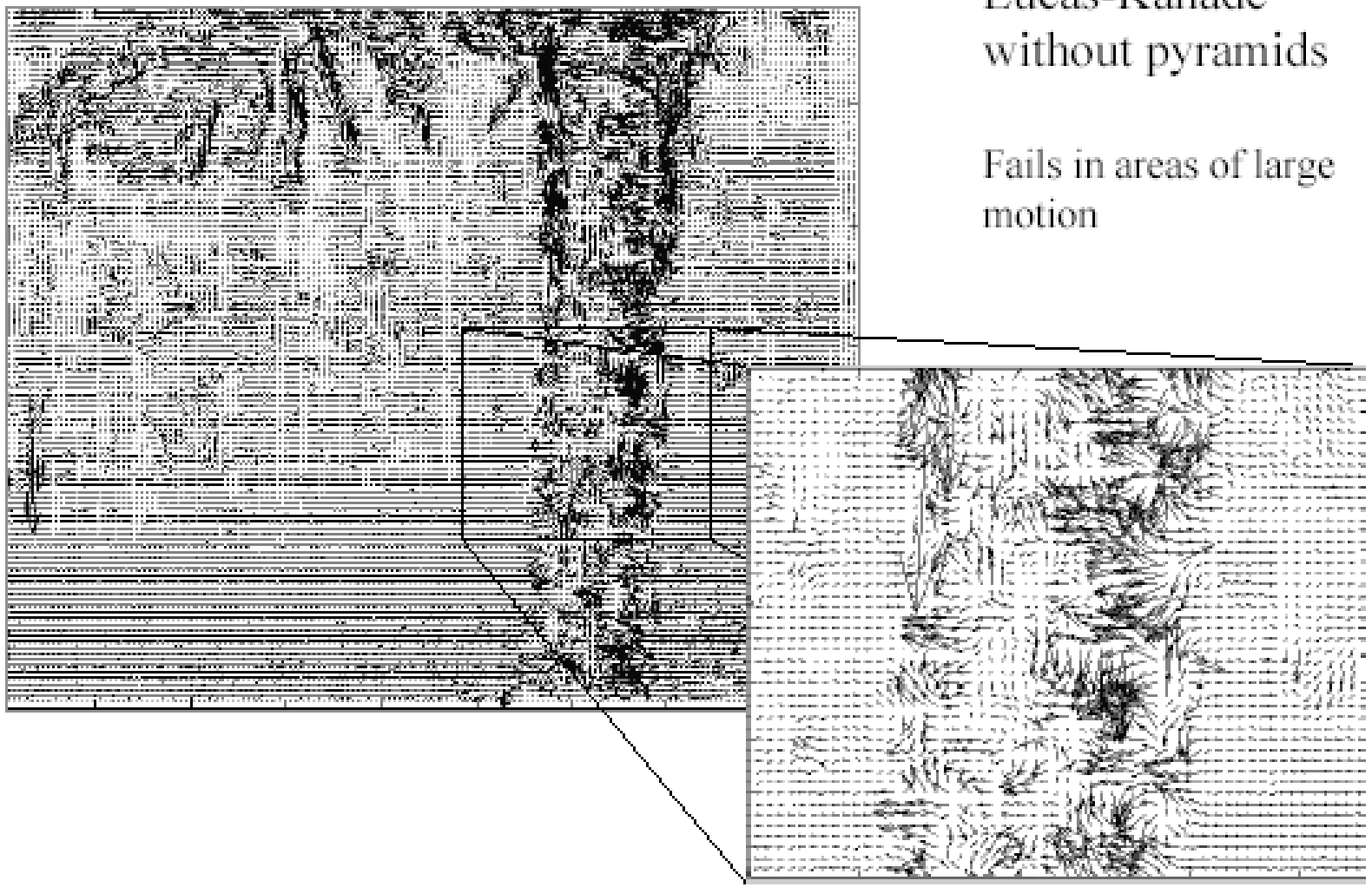
Source: Silvio Savarese

Coarse-to-fine optical flow estimation

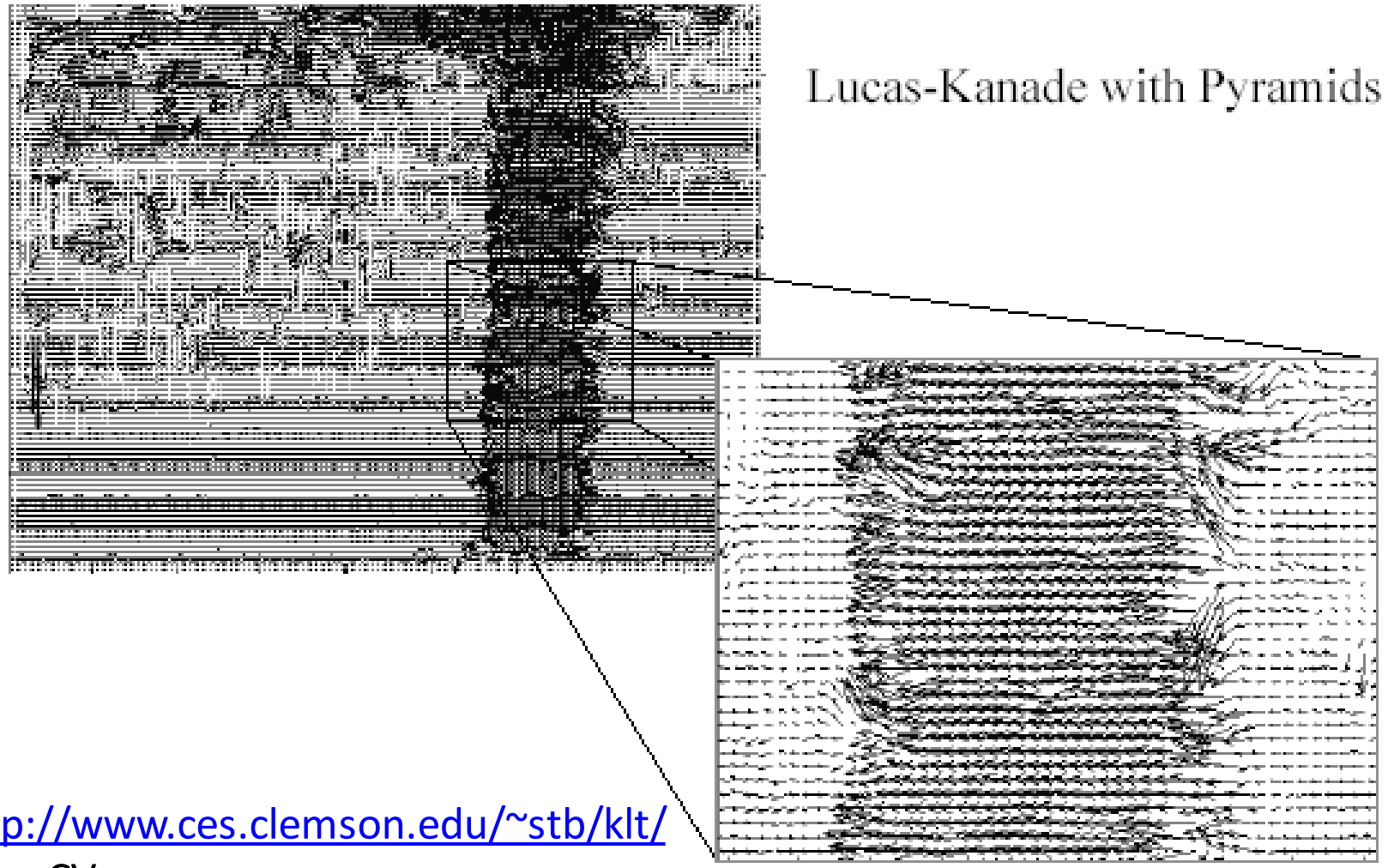


Source: Silvio Savarese

Optical Flow Results



Optical Flow Results



- http://www.ces.clemson.edu/~stb/klt/
- OpenCV

Summary

- Pyramids for large motion
  - Motivation
  - Method
  - Results