Lecture 15: Motion

Motion: applications

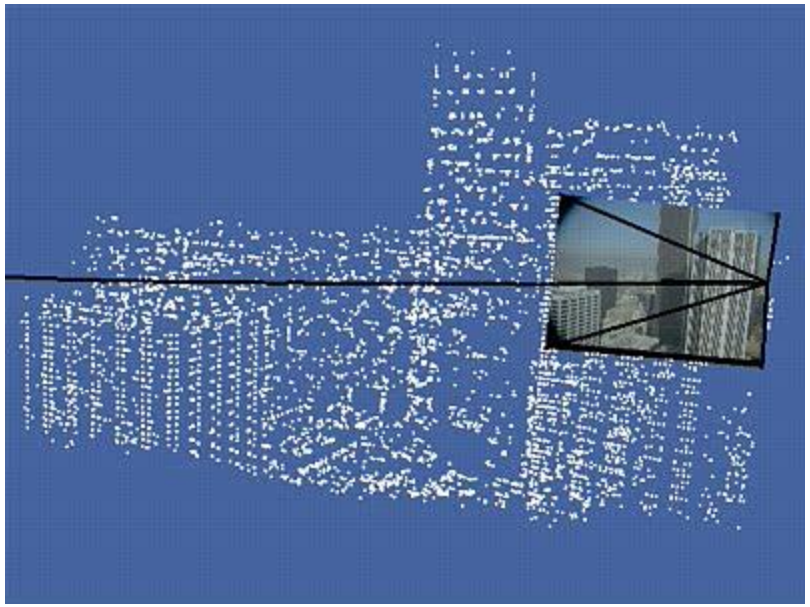
Juan Carlos Niebles and Jiajun Wu

CS131 Computer Vision: Foundations and Applications

What will we learn today?

- Applications

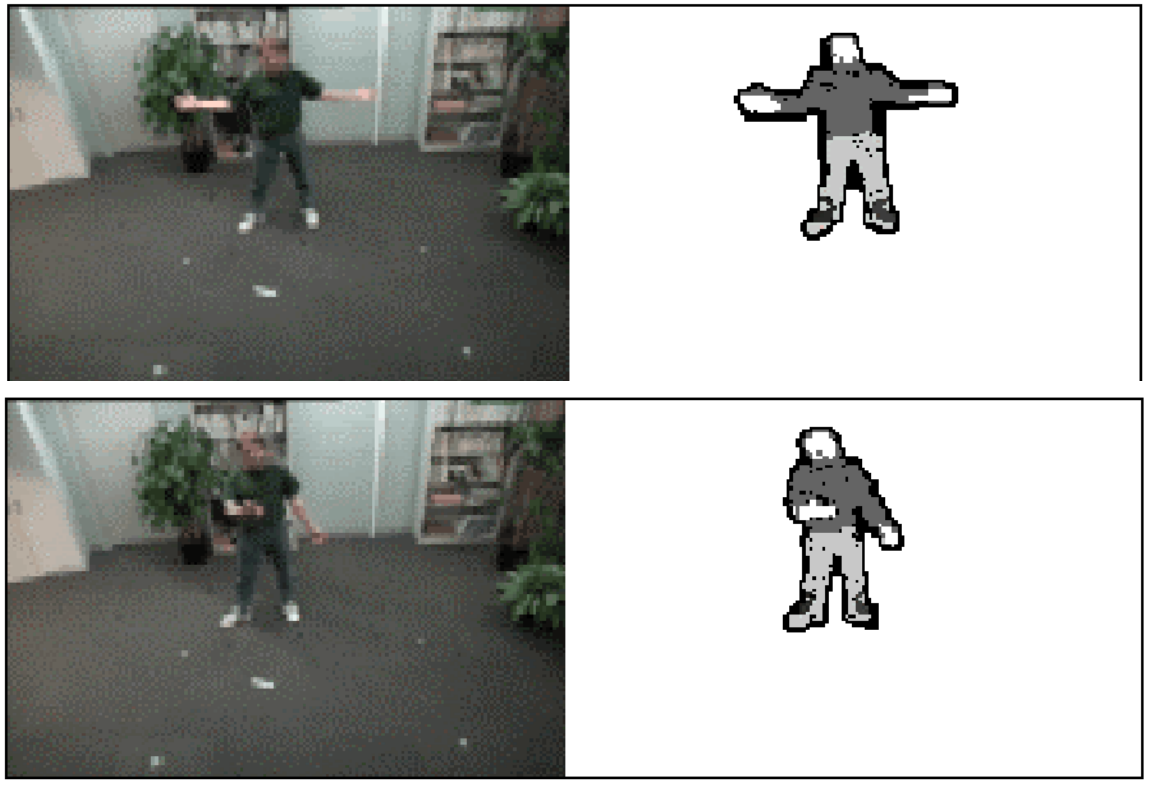
Estimating 3D structure



Source: Silvio Savarese

Segmenting objects based on motion cues

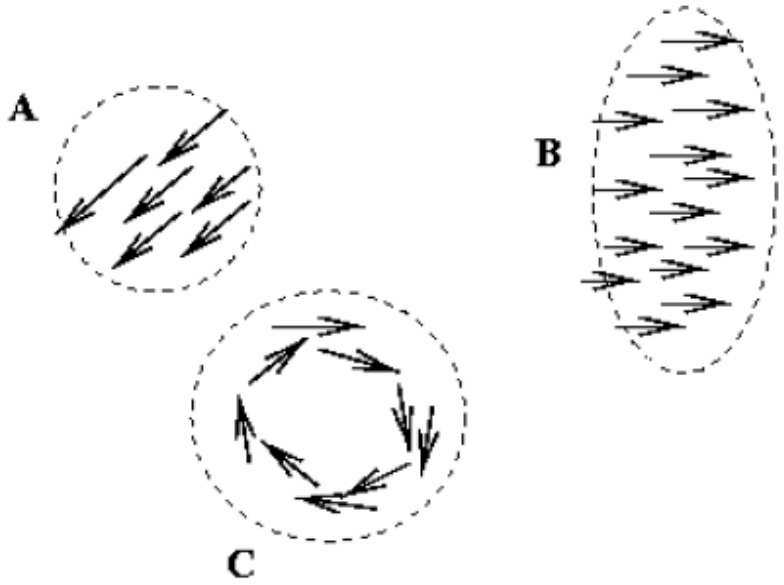
- Background subtraction
  - A static camera is observing a scene
  - Goal: separate the static *background* from the moving *foreground*

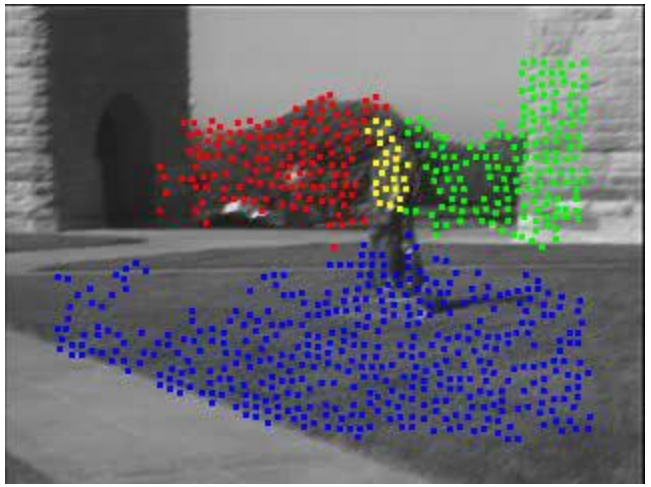


Source: Silvio Savarese

Segmenting objects based on motion cues

- Motion segmentation
  - Segment the video into multiple *coherently* moving objects

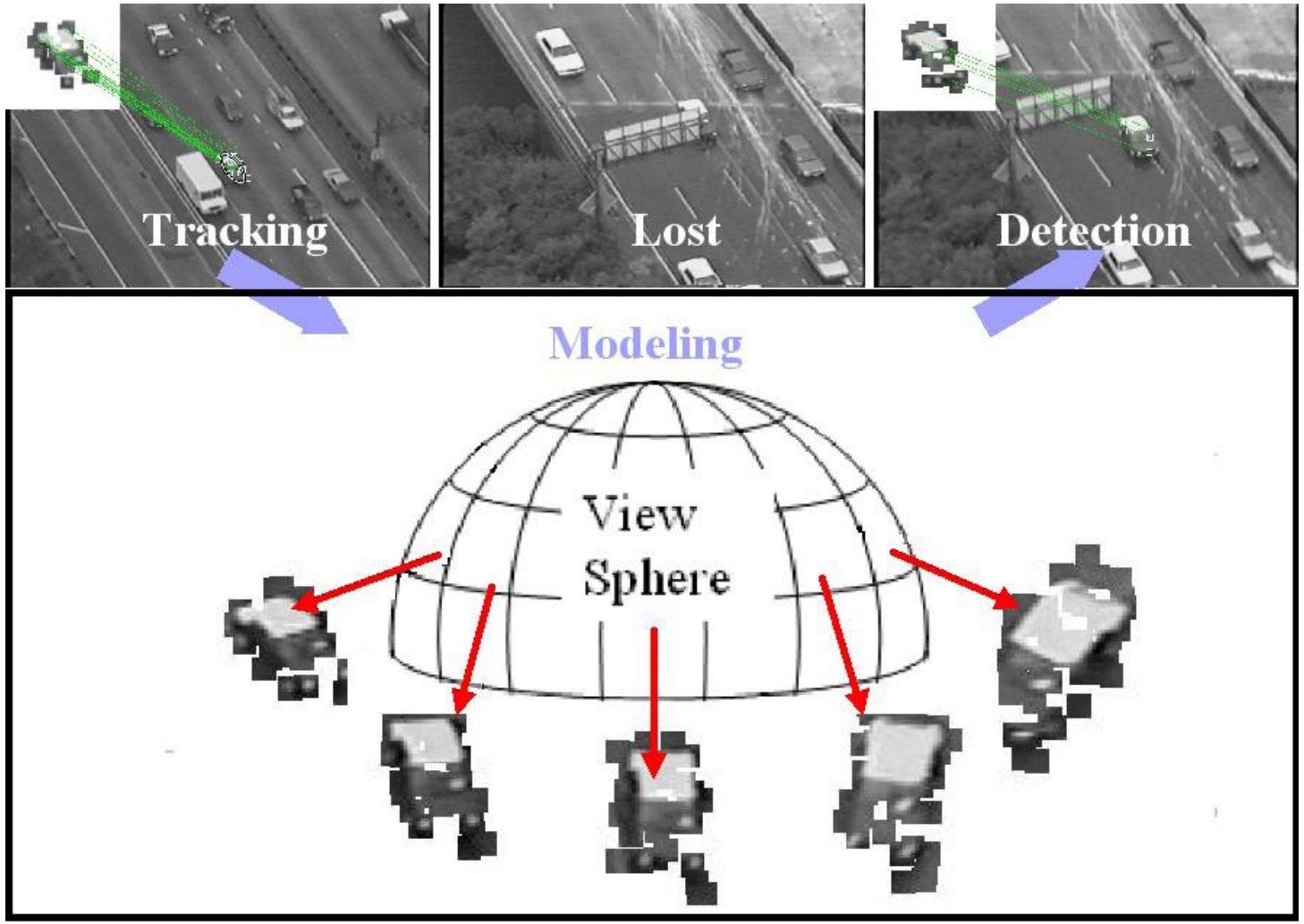




S. J. Pundlik and S. T. Birchfield, Motion Segmentation at Any Speed, Proceedings of the British Machine Vision Conference (BMVC) 2006

Source: Silvio Savarese

Tracking objects



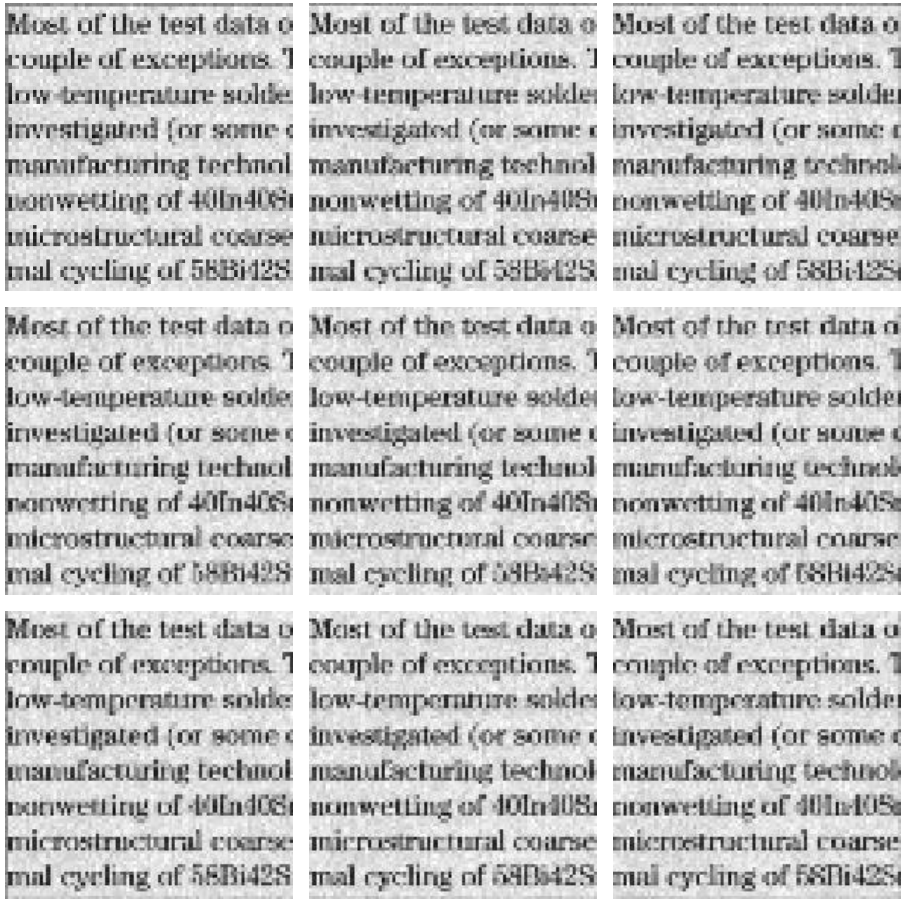
Z.Yin and R.Collins, "On-the-fly Object Modeling while Tracking," *IEEE Computer Vision and Pattern Recognition (CVPR '07),* Minneapolis, MN, June 2007.

Source: Silvio Savarese

Synthesizing dynamic textures

Super-resolution

Example: A set of low quality images



Source: Silvio Savarese

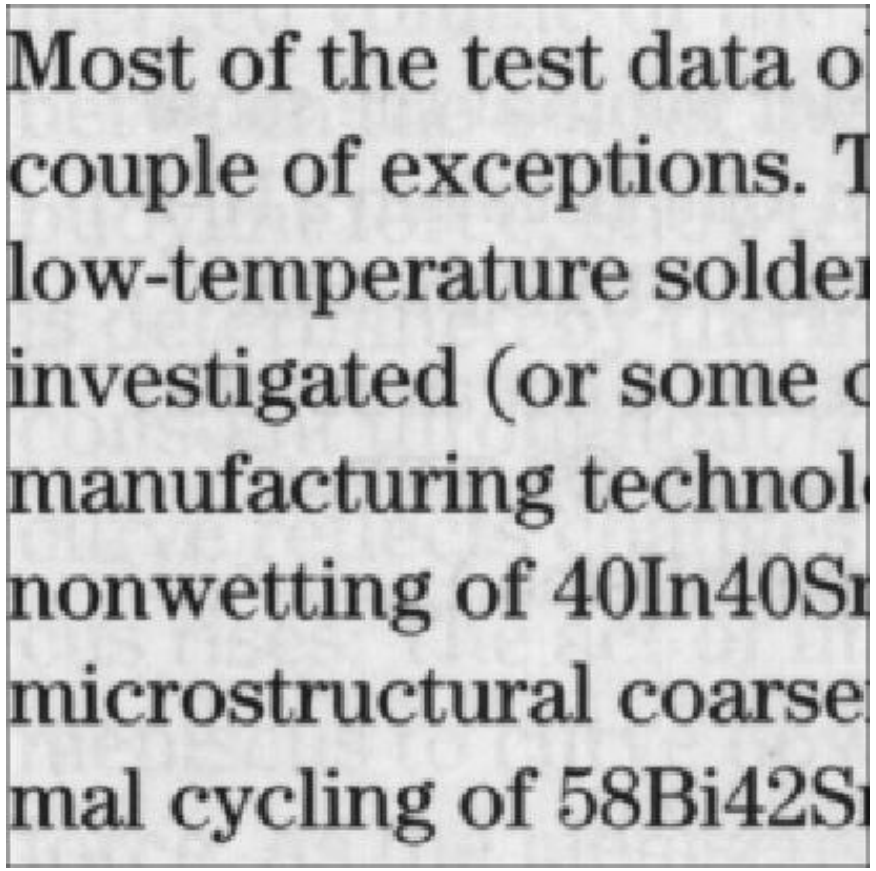
Super-resolution

Each of these images looks like this:

Source: Silvio Savarese

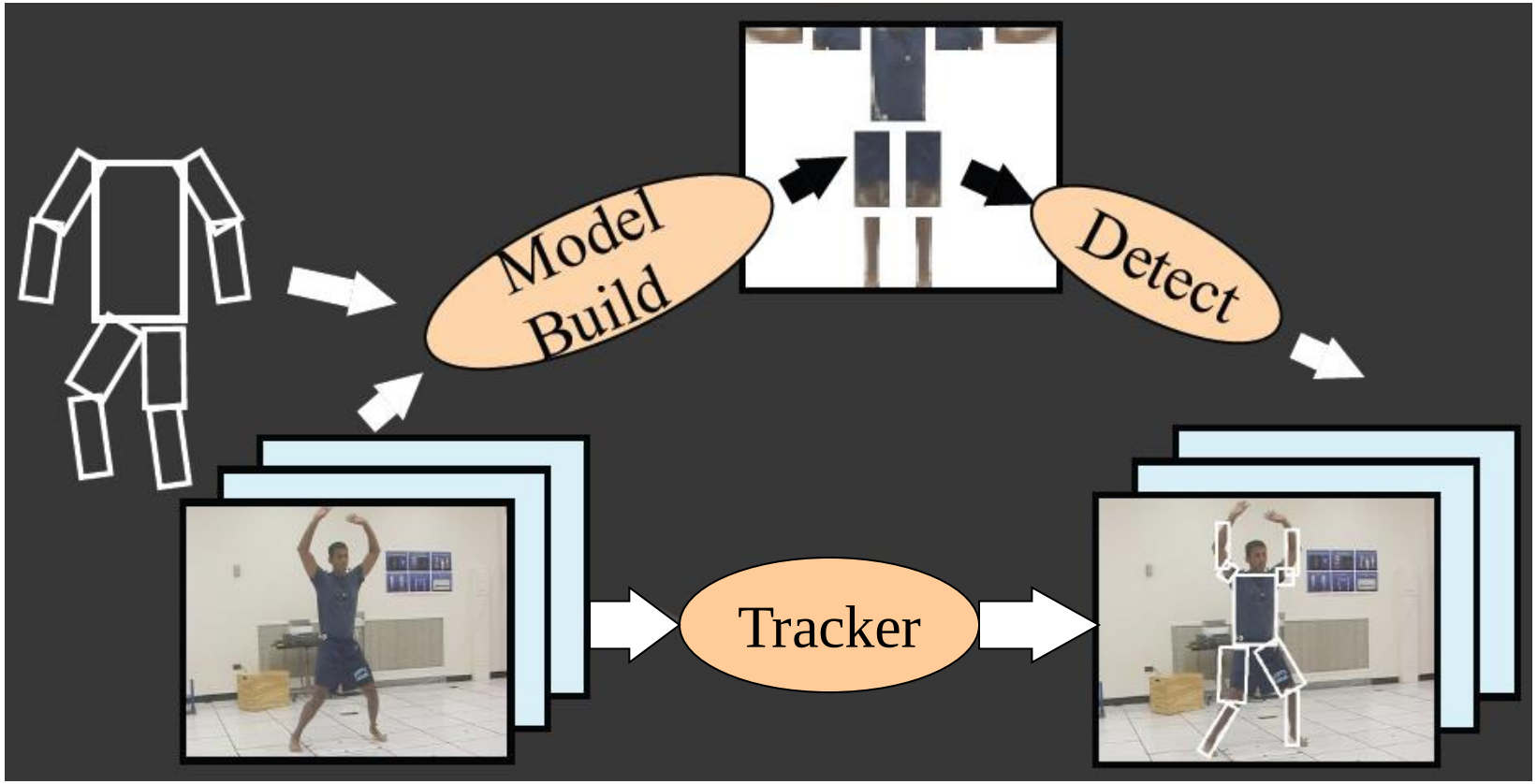
Super-resolution

The recovery result:



Source: Silvio Savarese

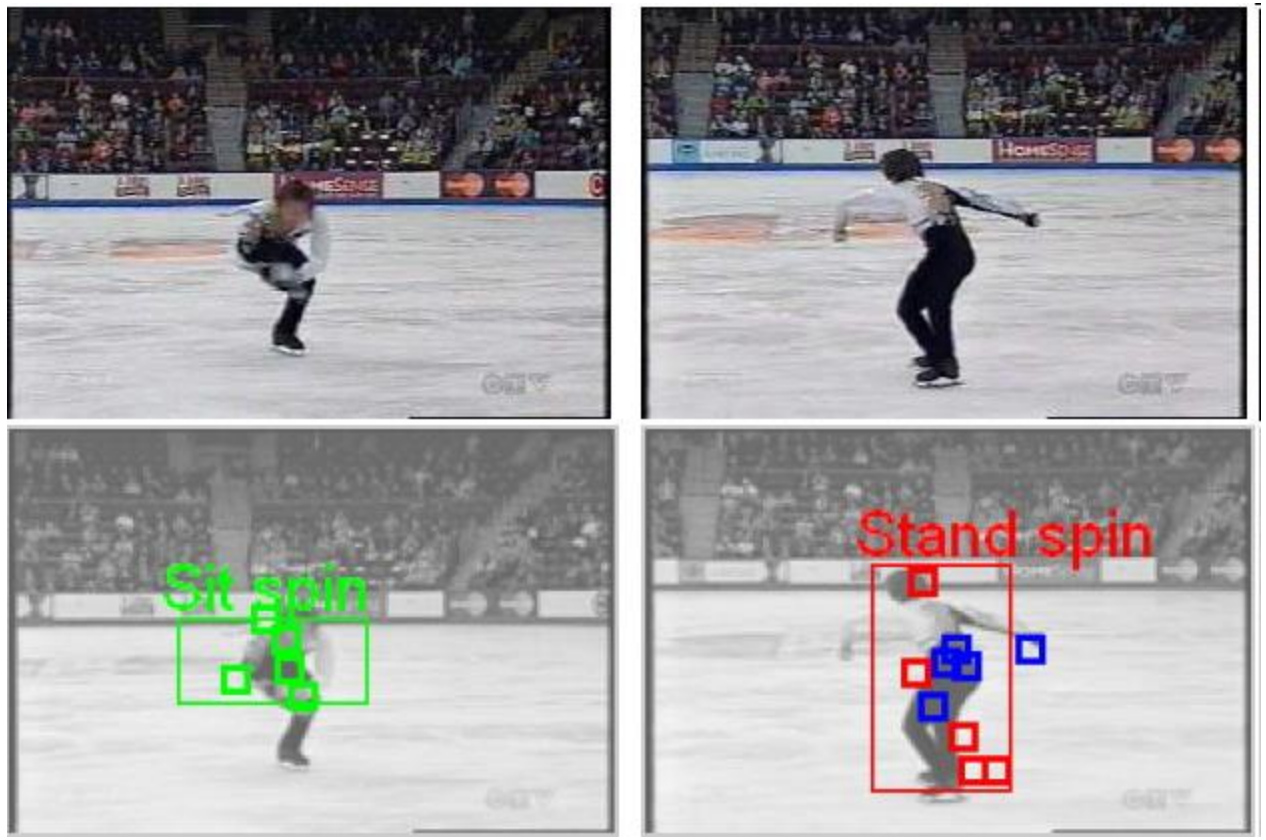
Recognizing events and activities



D. Ramanan, D. Forsyth, and A. Zisserman. Tracking People by Learning their Appearance. PAMI 2007.

Source: Silvio Savarese

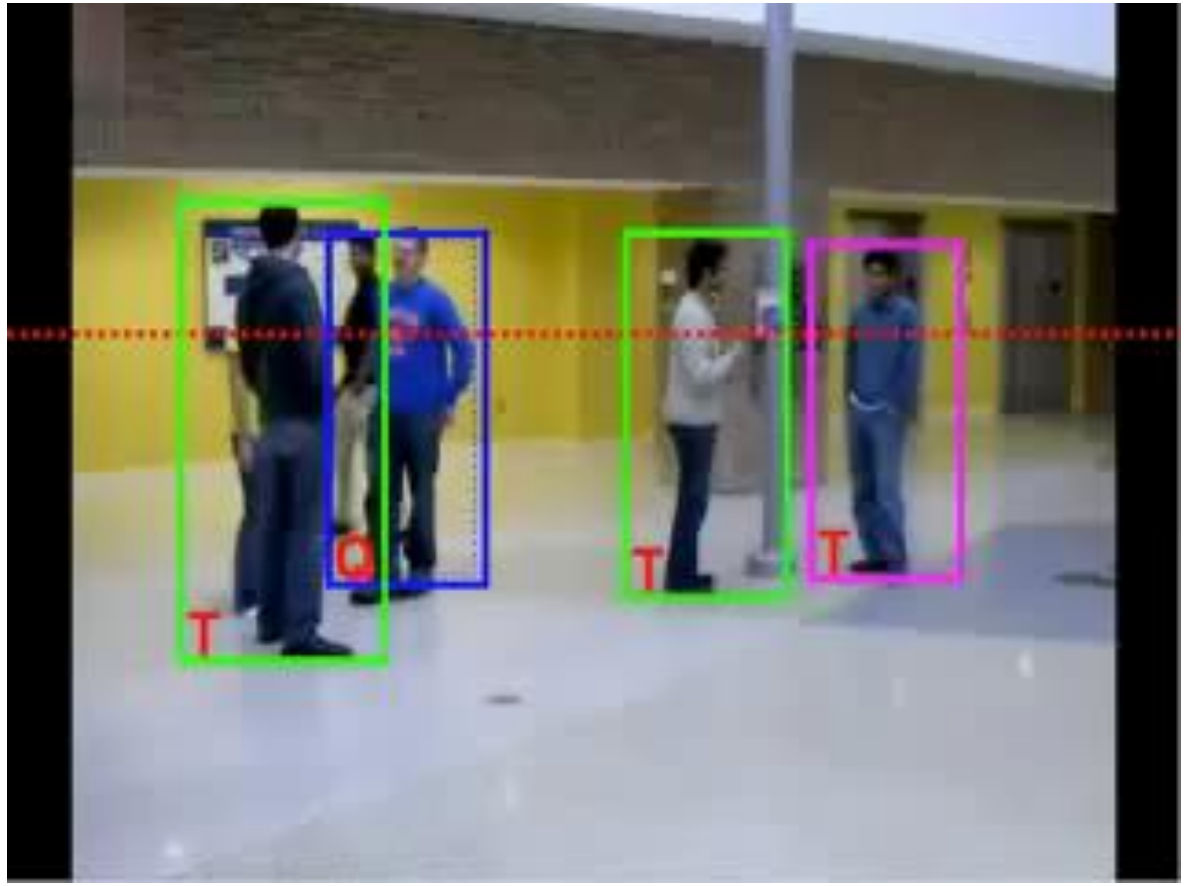
Recognizing events and activities



Juan Carlos Niebles, Hongcheng Wang and Li Fei-Fei, **Unsupervised Learning of Human Action Categories Using Spatial-Temporal Words**, *(BMVC)*, Edinburgh, 2006.

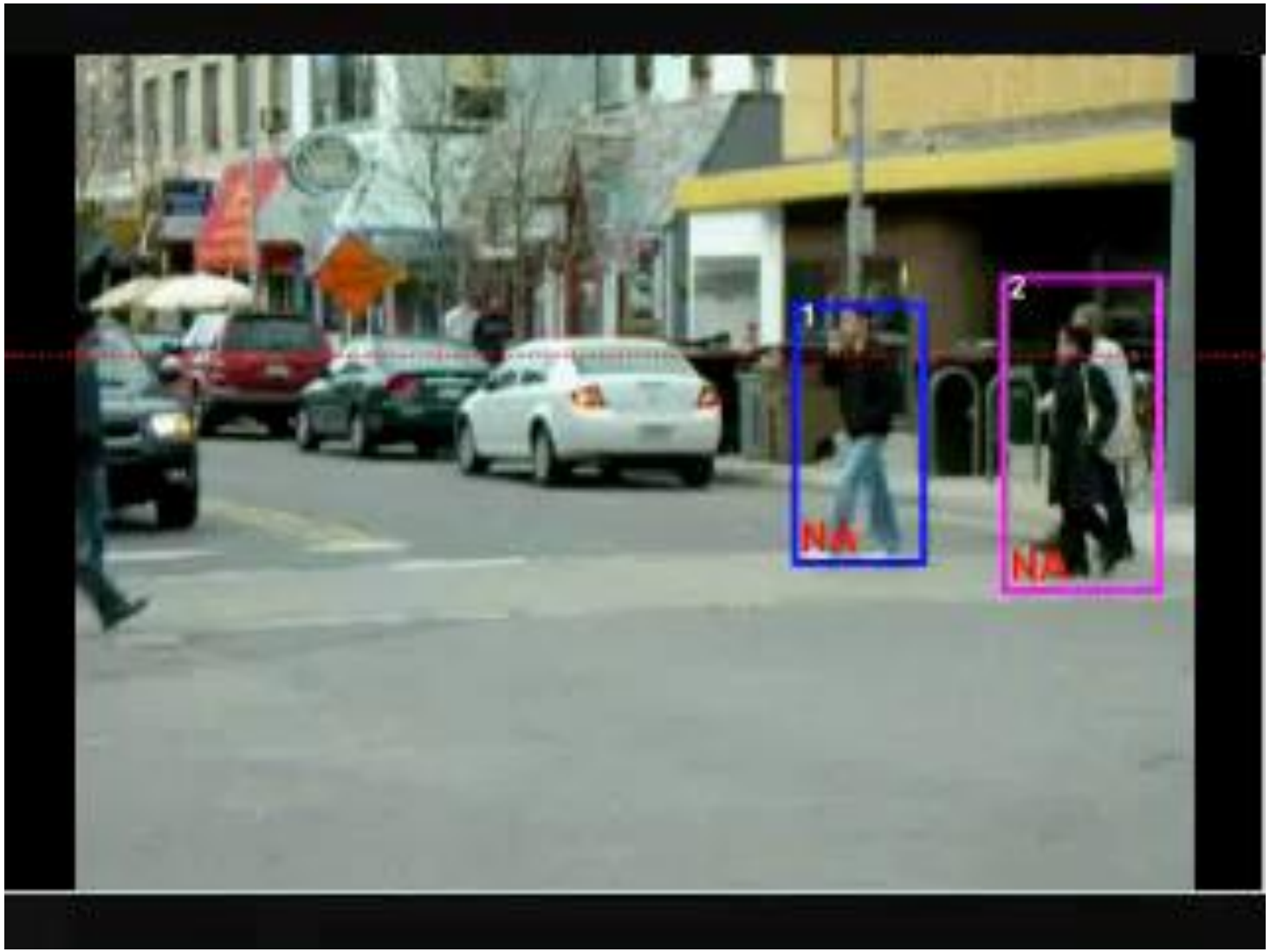
Recognizing events and activities

Crossing – Talking – Queuing – Dancing – jogging



W. Choi & K. Shahid & S. Savarese WMC 2010

Source: Silvio Savarese

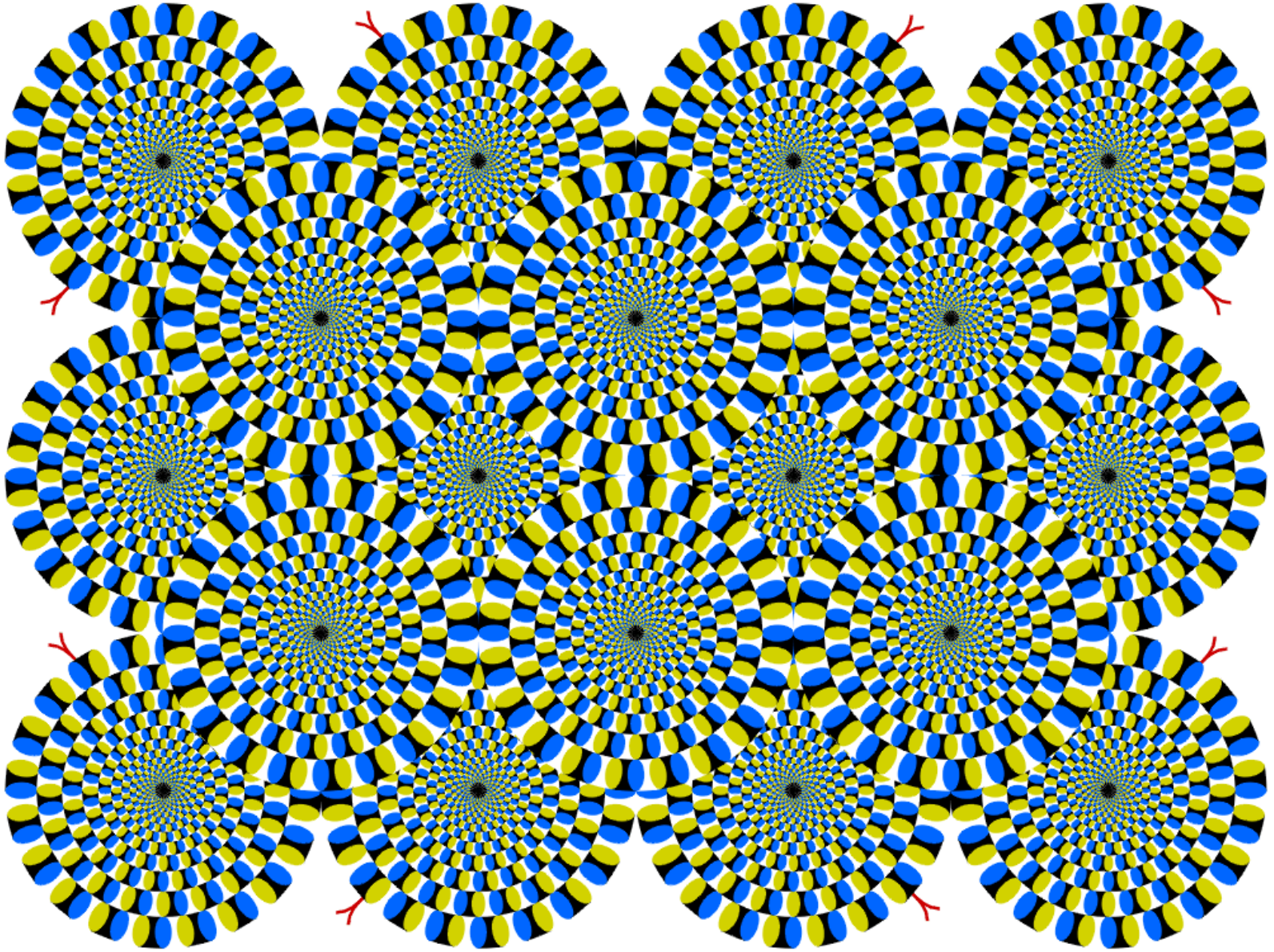


W. Choi, K. Shahid, S. Savarese, "What are they doing? : Collective Activity Classification Using Spatio-Temporal Relationship Among People", 9th International Workshop on Visual Surveillance (VSWS09) in conjuction with ICCV 09

Human Event Understanding: From Actions to Tasks

- A recent talk:
  http://tv.vera.com.uy/video/55276

Optical flow without motion!



Summary

- Applications