

Lecture 15: Motion

Motion: applications

Juan Carlos Niebles and Jiajun Wu

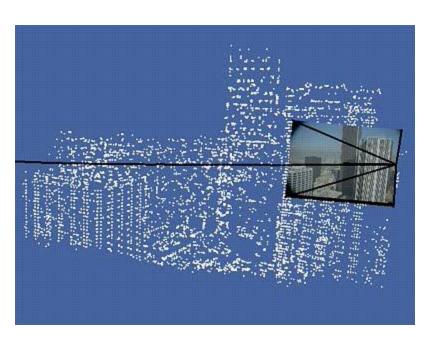
CS131 Computer Vision: Foundations and Applications

What will we learn today?

Applications

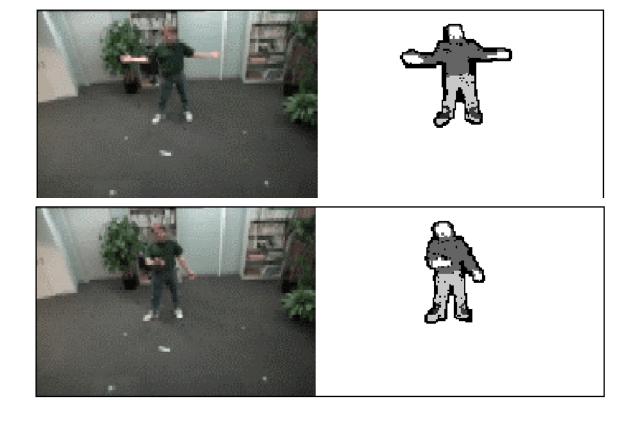
Estimating 3D structure





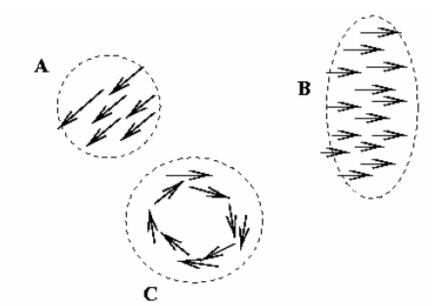
Segmenting objects based on motion cues

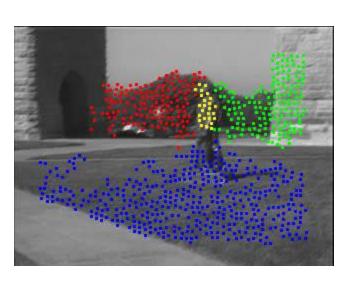
- Background subtraction
 - A static camera is observing a scene
 - Goal: separate the static background from the moving foreground



Segmenting objects based on motion cues

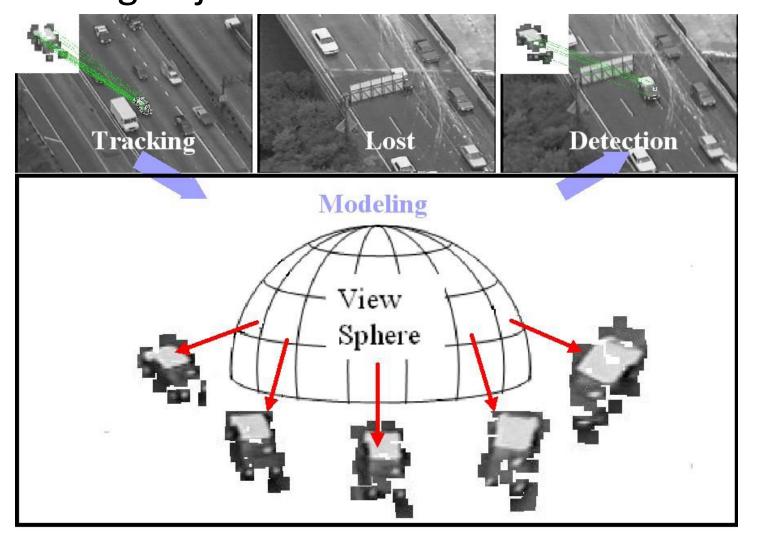
- Motion segmentation
 - Segment the video into multiple coherently moving objects





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.



Synthesizing dynamic textures



Super-resolution

Example: A set of low quality images

couple of exceptions. T low-temperature solde. investigated (or some c manufacturing technol nonwetting of 40ln40Sr microstructural coarse mal cycling of 58Bi42S

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Most of the test data o Most of the test data o Most of the test data o couple of exceptions. I low-temperature solder manufacturing technolinonwetting of 401n40St microstructural coarse mal cycling of 58Bi42Si

Super-resolution

Each of these images looks like this:

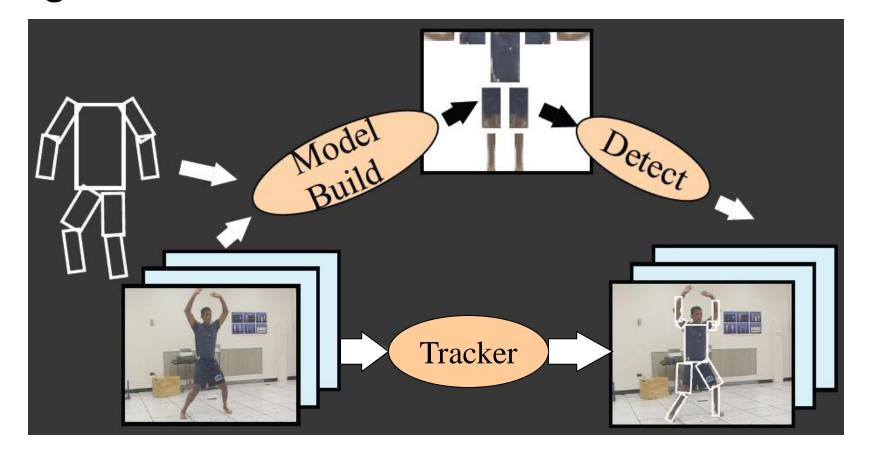
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Super-resolution

The recovery result:

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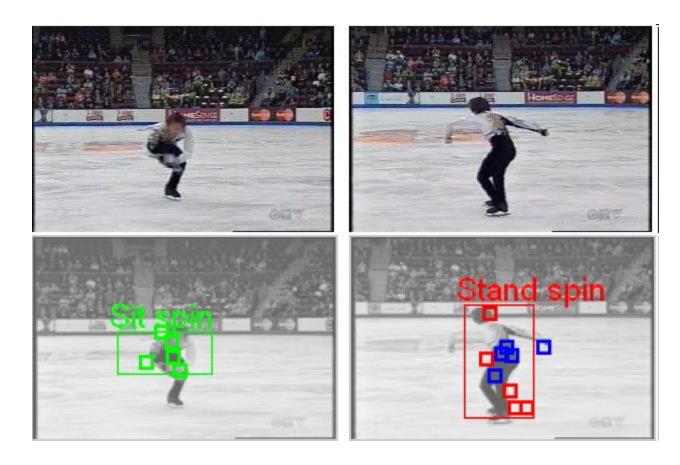
Recognizing events and activities



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



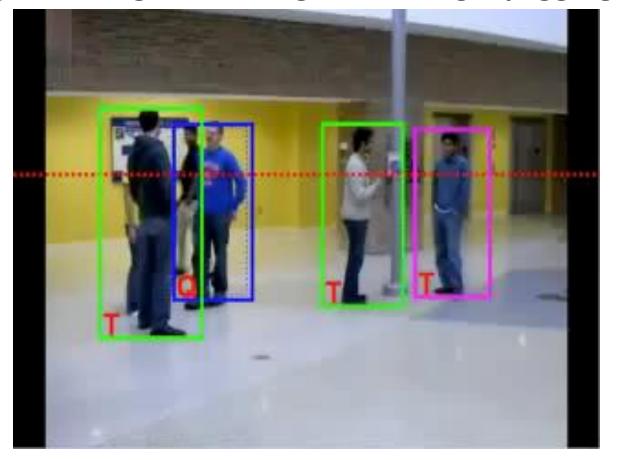
Recognizing events and activities



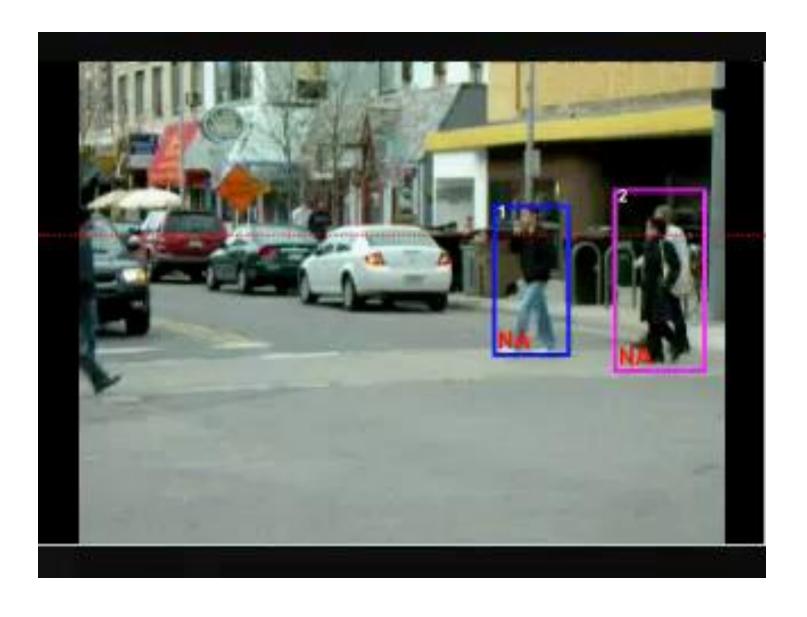
Juan Carlos Niebles, Hongcheng Wang and Li Fei-Fei, **Unsupervised Learning of Human Action Categories Using Spatial-Temporal Words**, (**BMVC**), Edinburgh, 2006.

Recognizing events and activities

Crossing – Talking – Queuing – Dancing – jogging



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



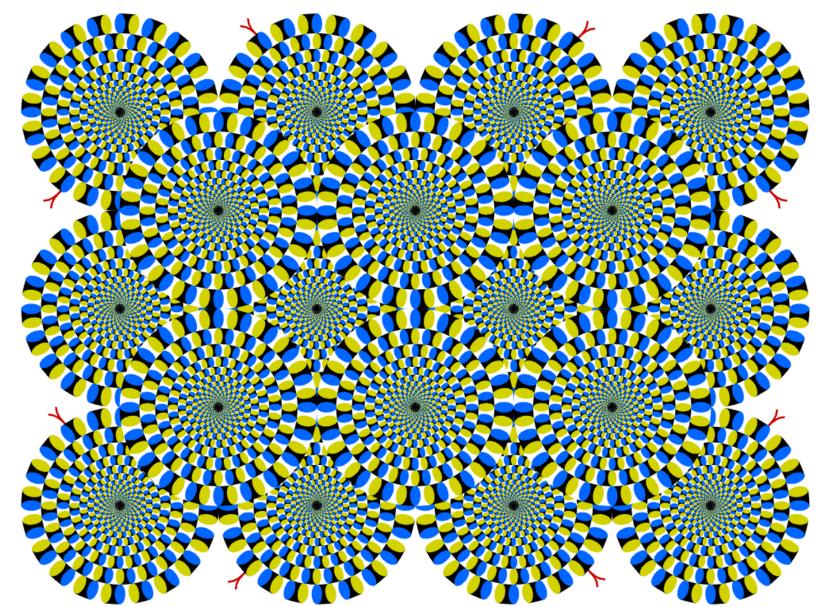
W. Choi, K. Shahid, S. Savarese, "What are they doing?: Collective Activity Classification Using Spatio-Temporal Relationship Among People", 9th International Workshop on Visual Surveillance (VSWS09) in conjuction with ICCV 09

Human Event Understanding: From Actions to Tasks



http://tv.vera.com.uy/video/55276

Optical flow without motion!



Summary

Applications

