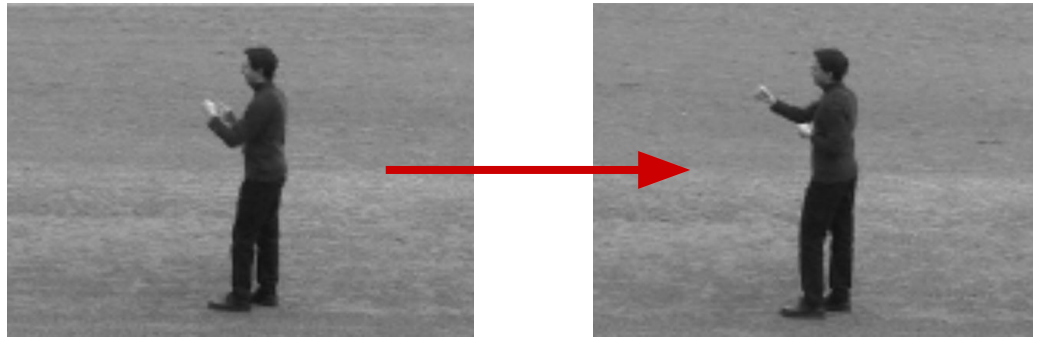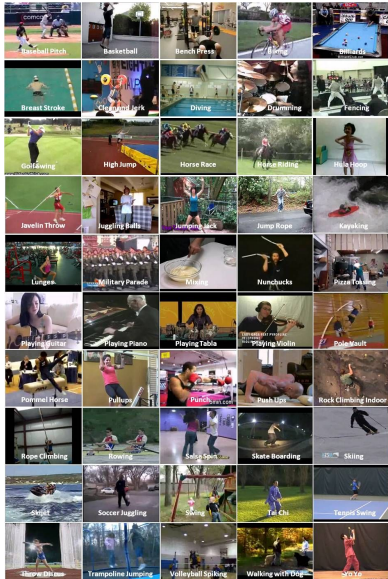# Action Recognition with Improved Trajectories

Heng Wang and Cordelia Schmid
LEAR, INRIA, France

Introduction

- Problem
  - Action recognition - Classify a set of frames into a motion.

What is he doing?

[UCF Sport dataset]

Introduction

- Difficulties
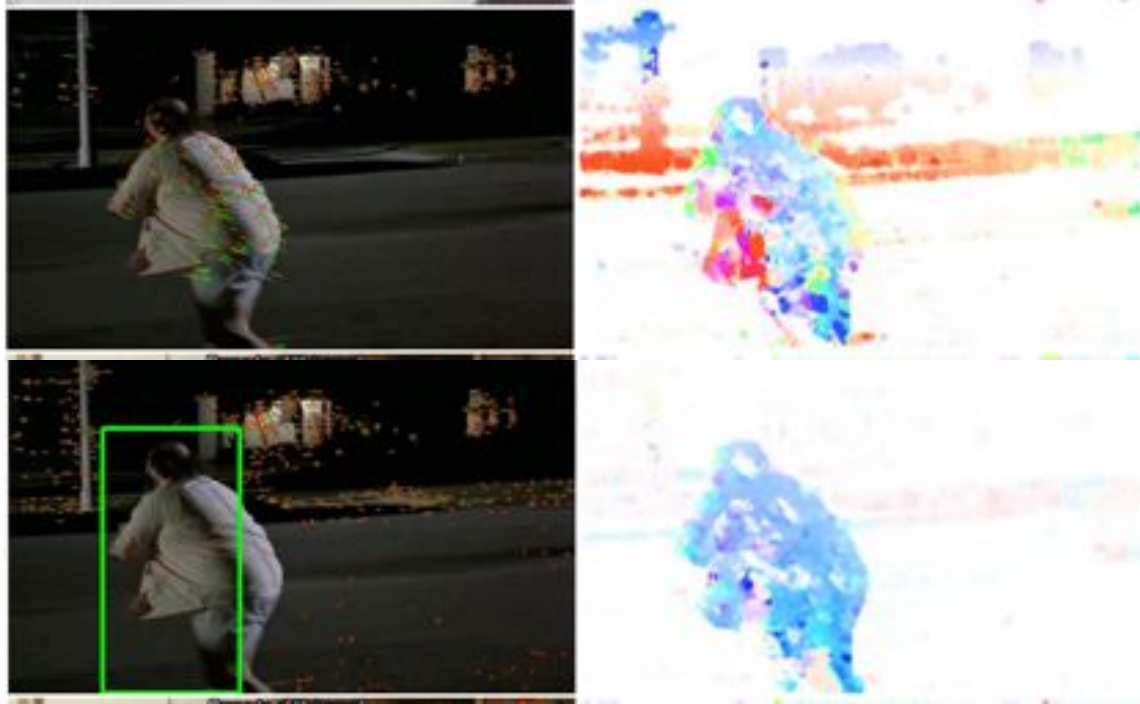   - Motion blur
    - Background trajectories

[UCF Sport dataset]

Introduction

- How do we improve noisy trajectories?
    - Estimate camera motion
    - Human detector

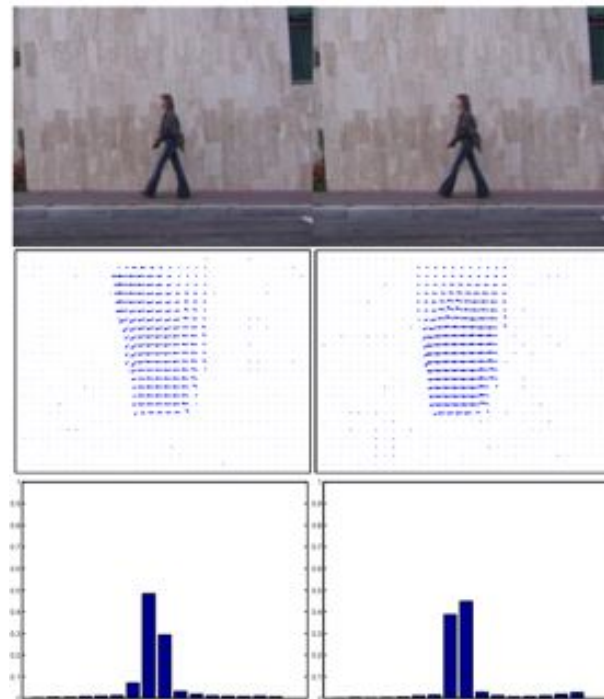[Hollywood2]

Introduction

[Hollywood2]

Background

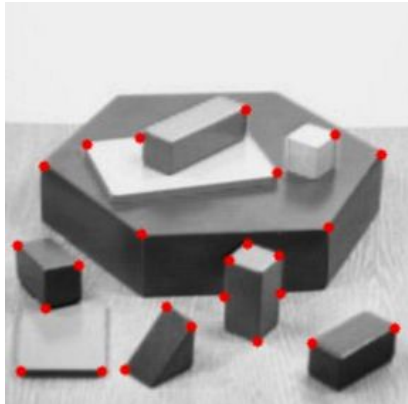- Motion-based Descriptors
  - HOF
  - MBH
  - 3D SIFT
  - Extended SURF
  - HOG3D

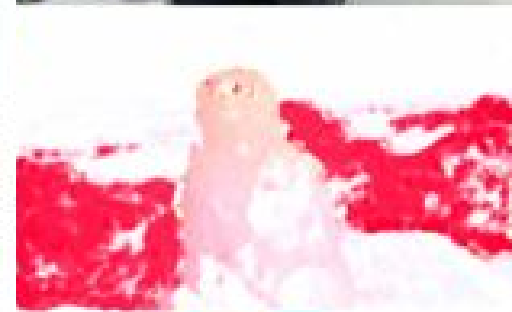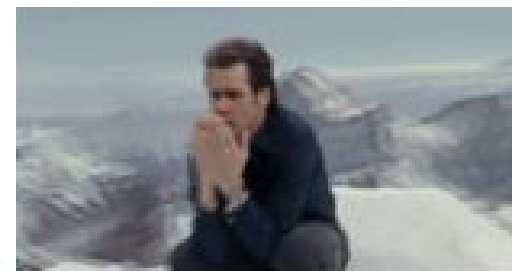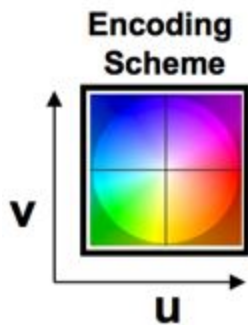[Chaudhry et. al, OpenCV]

Background

- Approach
  - Approximate camera
    - SURF
    - Good Features to Track

[Opencv documentation]

Background

- Approach
  - WarpFlow
    - warp optical flow
  - RmTrack
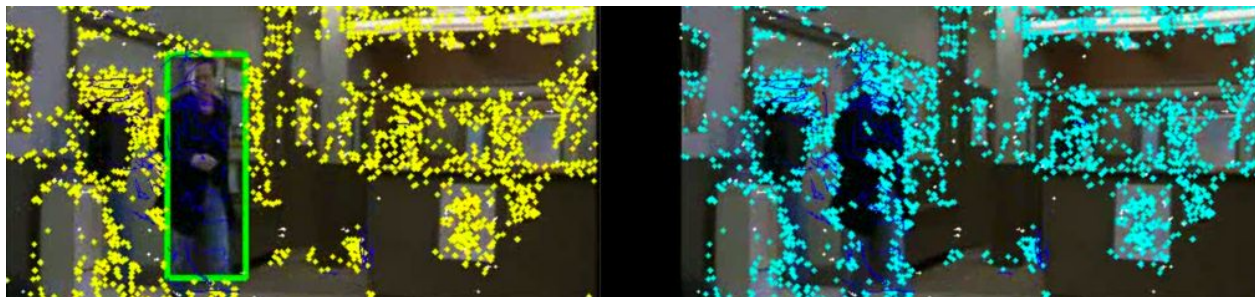   - remove background

Encoding Scheme

[Hollywood2]

Experiment

- Datasets
  - UCF50
    - Youtube
    - Semi-cluttered
  - HMDB51
    - Most challenging
    - Varies in camera, quality
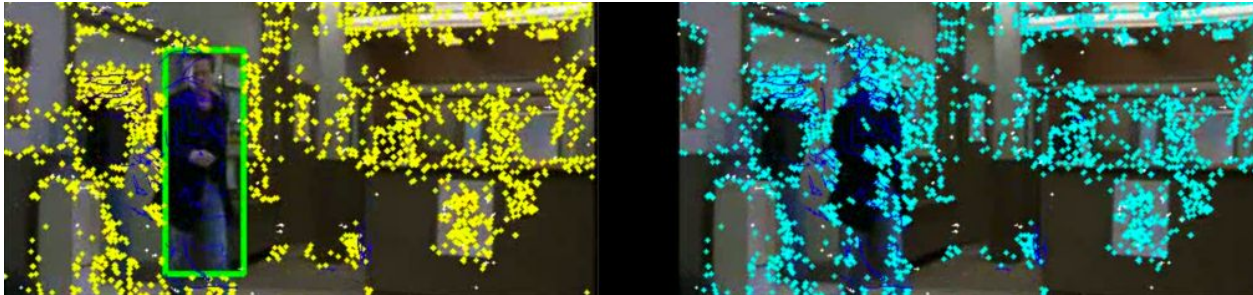

[UCF101]

Experiment

- **Visual Comparison**
  - Baseline - Dense Trajectories
  - Camera estimation + human mask
- **Demo**

[Hollywood2]

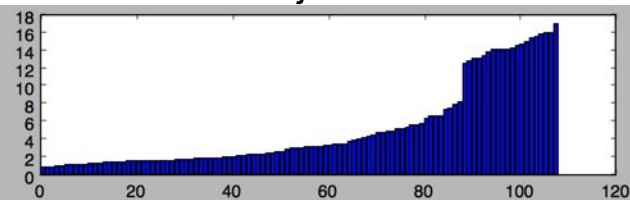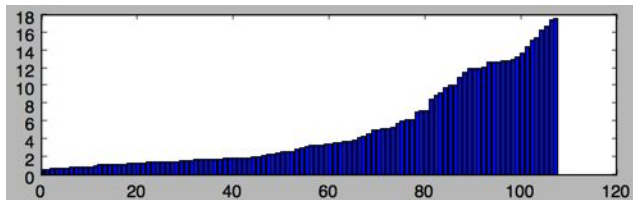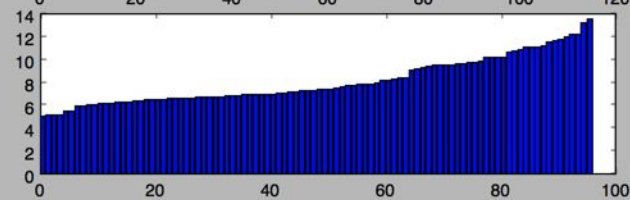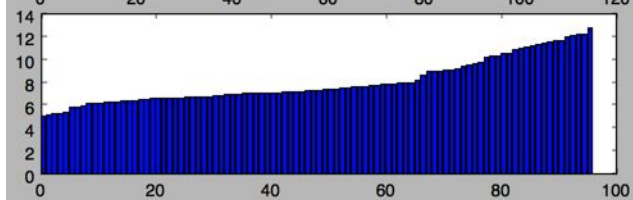# Experiment

- How do descriptors do?
  - HOF
  - HOG
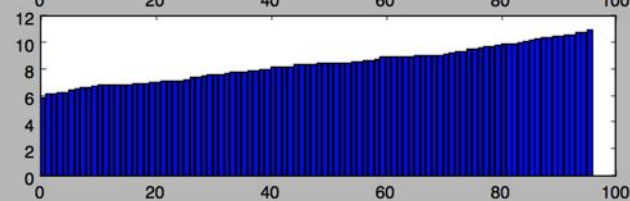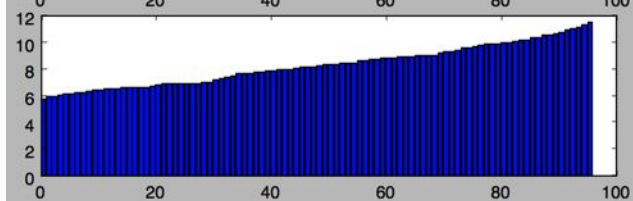 - MBH

[Hollywood2]

Experiment

Baseline
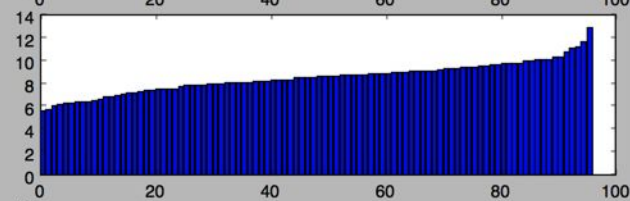
Dense Trajectories Stab

HOF

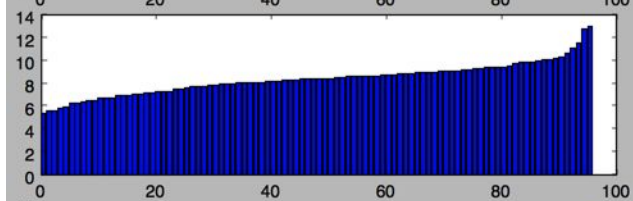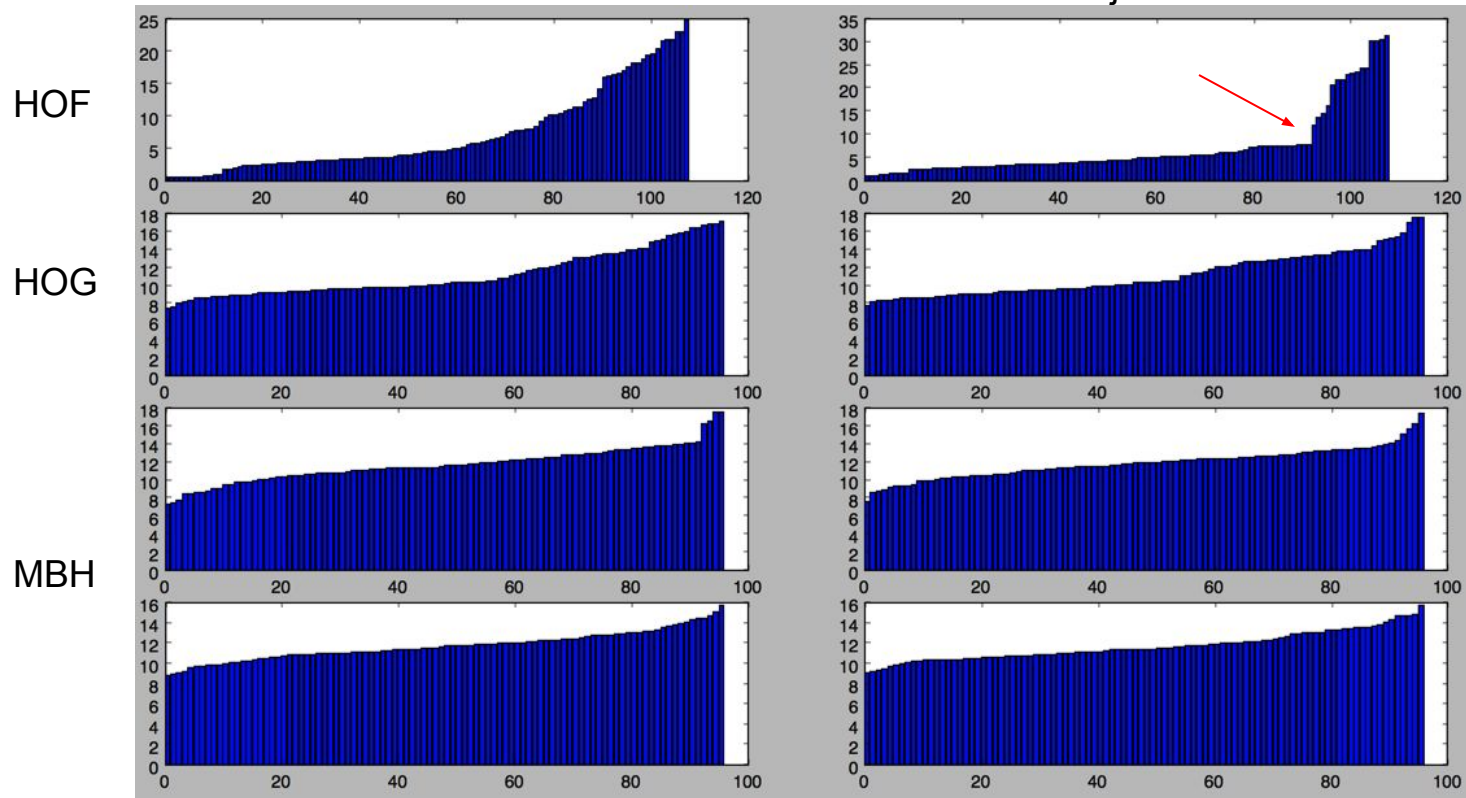HOG

MBH

Experiment

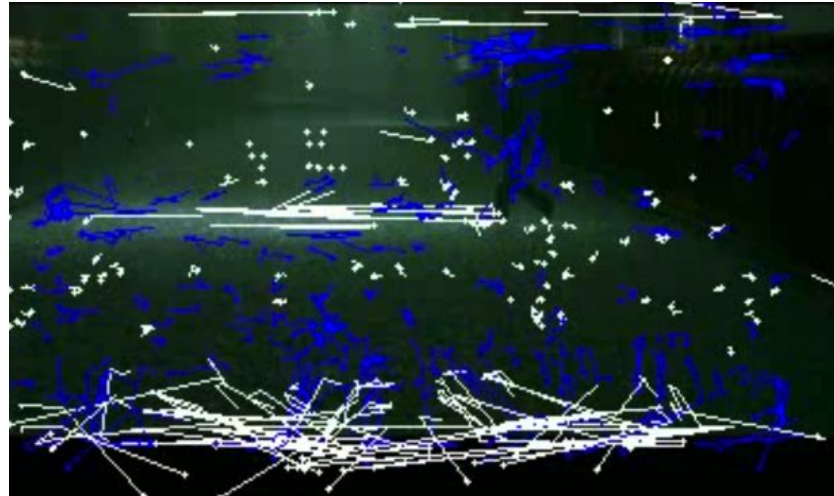Baseline   Dense Trajectories Stab

HOF

HOG

MBH

Experiment

- Failure cases
  - Motion blur
  - Illumination changes
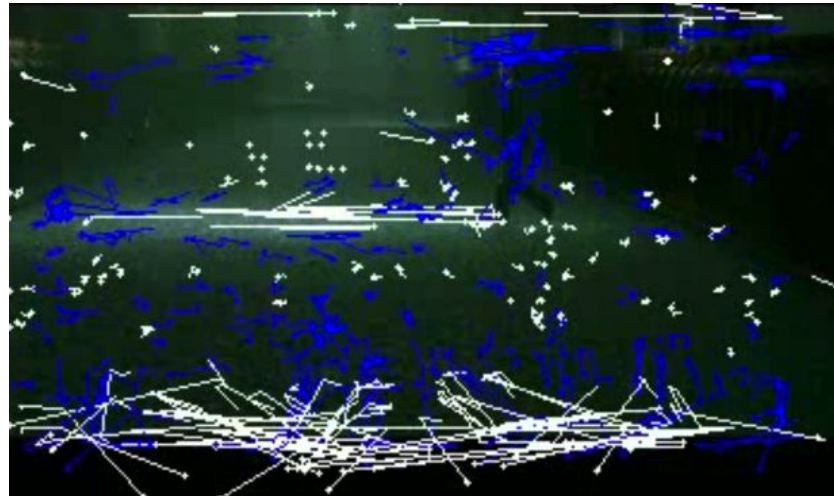 - Lots of humans

[HMDB51]

Experiment

- Failure cases
  - Motion blur
  - Illumination changes
  - Lots of humans

  Why?

  Recall how we
  estimate camera
  motion - SURF

[HMDB51]

Demos