# Action Recognition with Improved Trajectories

# Introduction

- Current approach based on space-time features, dense trajectory

- Suggested method aim to remove the motion of the camera for a more accurate trajectory
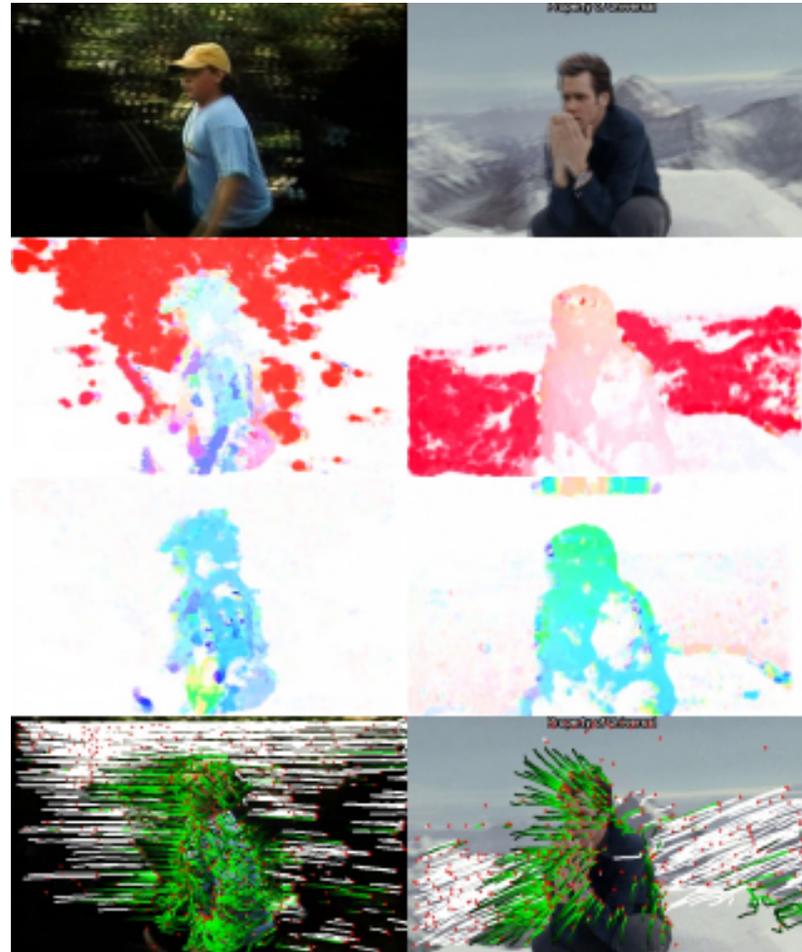
# Camera Motion Estimation

- Extract SURF features
- Estimate Homography => Camera Motion
- Rectified optical flow
- Threshold the trajectories
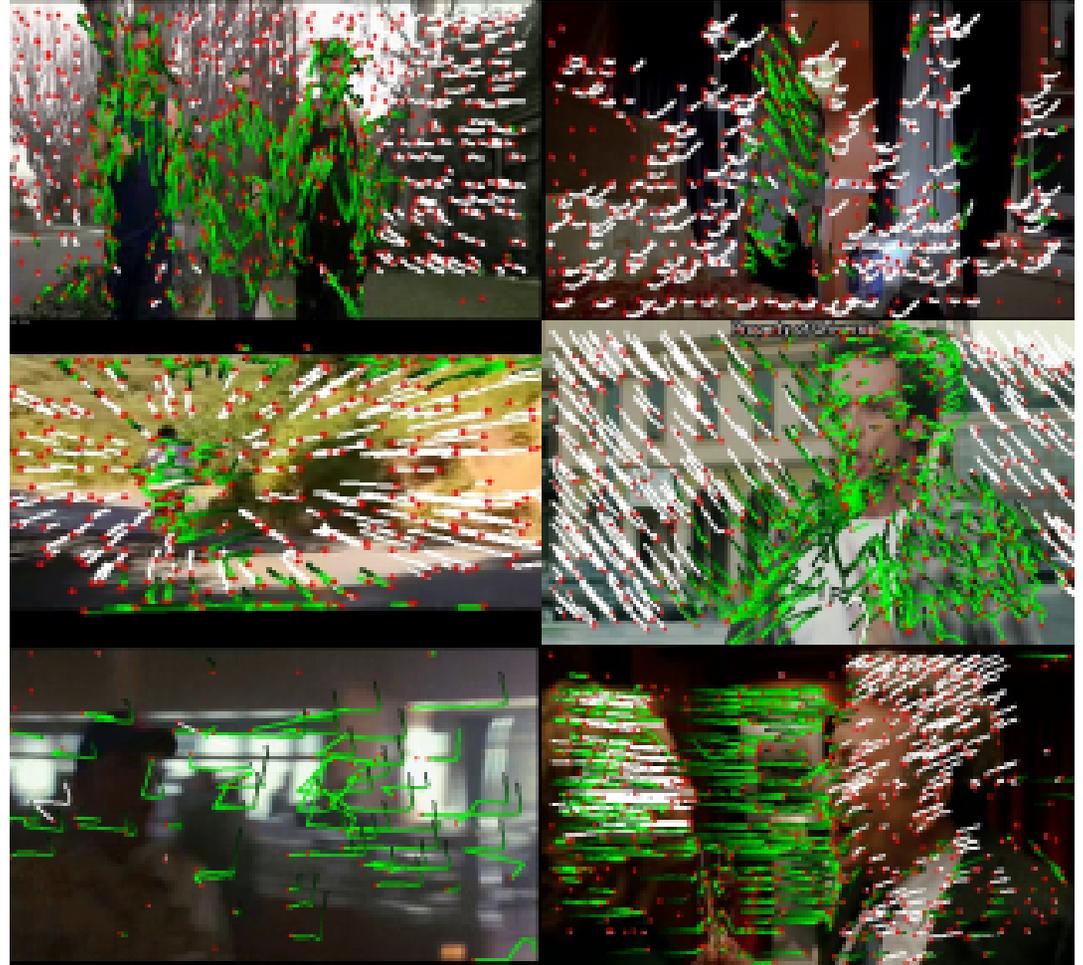
# Human-Background Inconsistent Matches
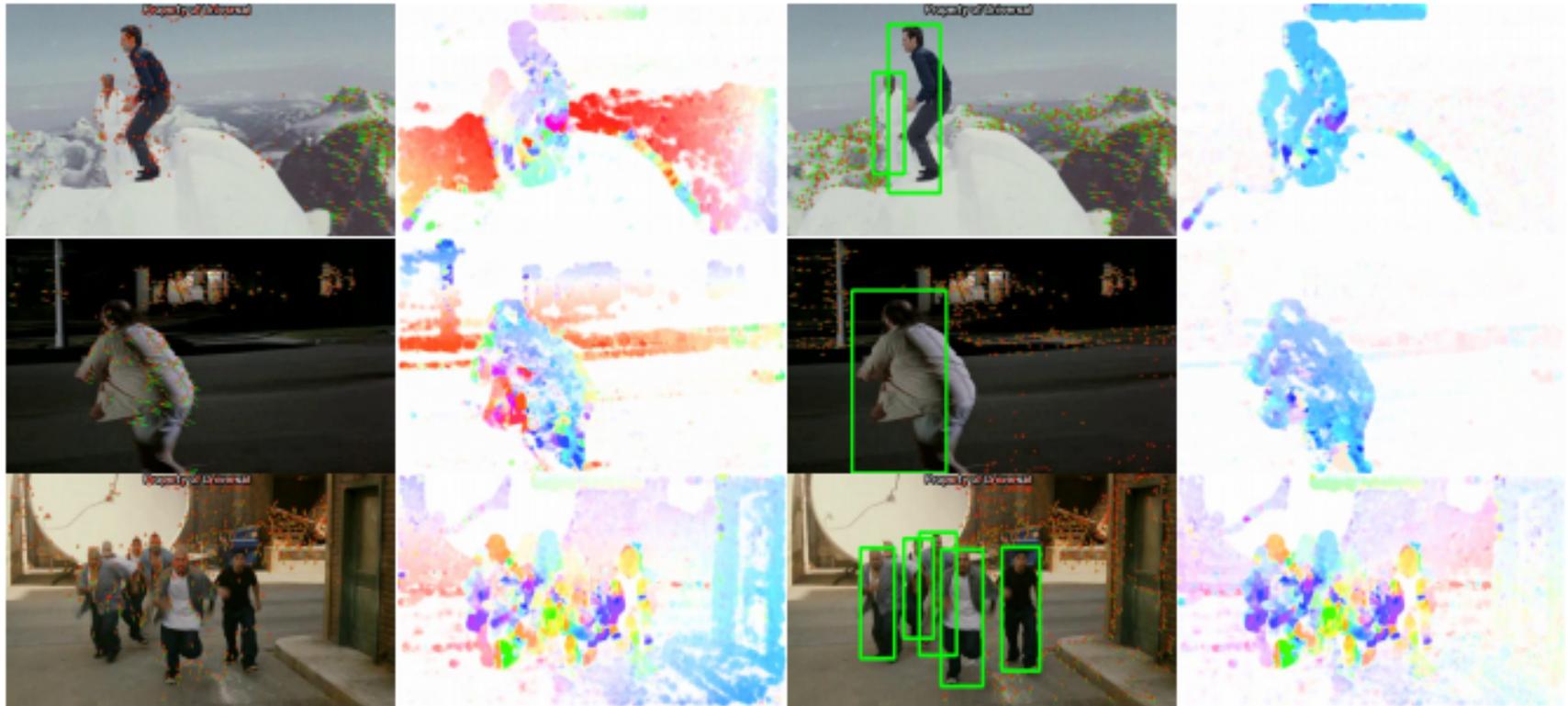
# Trajectory Features

->Feature points (15 frames)

->descriptors :

- estimate homography

- warp next frame with previous homography

- compute descriptor ( trajectory, HOF, MBH)
  based on warped flow

- normalized histogram

# Results



(a) AnswerPhone     (a) GetOutCar     (b) Push-Up     (b) Chew
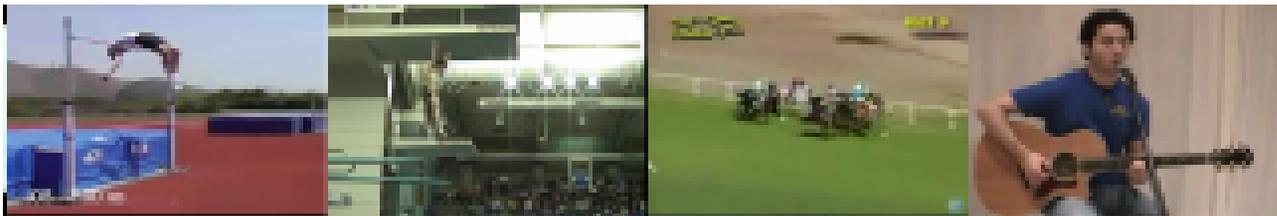
(c) High-Jump     (c) Springboard     (d) Horse-Race     (d) Playing-Guitar

(c) Vault     (c) Tennis-Serve     (d) Punch     (d) Ski-Jet

# Results

| | Hollywood2 | | | | HMDB51 | | | |
|---|---|---|---|---|---|---|---|---|
| | Baseline | WarpFlow | RmTrack | Combined | Baseline | WarpFlow | RmTrack | Combined |
| Trajectory | 42.2% | 47.6% | 42.4% | 48.5% | 25.4% | 31.0% | 26.9% | 32.4% |
| HOG | 46.9% | 46.2% | 46.7% | 47.1% | 38.4% | 38.7% | 39.6% | 40.2% |
| HOF | 51.4% | 58.1% | 53.4% | 58.8% | 39.5% | 48.5% | 41.6% | 48.9% |
| MBH | 57.4% | 60.3% | 58.6% | 60.5% | 49.1% | 50.9% | 50.8% | 52.1% |
| HOF+MBH | 58.2% | 62.3% | 59.7% | 62.6% | 49.8% | 53.5% | 51.0% | 54.7% |
| Combined | 60.1% | 63.6% | 61.7% | 64.3% | 52.2% | 55.6% | 53.9% | 57.2% |
| | Olympic Sports | | | | UCF50 | | | |
| | Baseline | WarpFlow | RmTrack | Combined | Baseline | WarpFlow | RmTrack | Combined |
| Trajectory | 62.4% | 73.7% | 66.3% | 77.2% | 65.3% | 72.6% | 67.8% | 75.2% |
| HOG | 77.0% | 76.3% | 78.7% | 78.8% | 81.8% | 81.6% | 82.6% | 82.6% |
| HOF | 74.5% | 86.2% | 77.6% | 87.6% | 74.3% | 85.4% | 79.4% | 85.1% |
| MBH | 82.4% | 87.5% | 86.0% | 89.1% | 86.5% | 88.4% | 88.0% | 88.9% |
| HOF+MBH | 82.1% | 88.3% | 86.2% | 89.7% | 87.1% | 89.3% | 87.5% | 89.5% |
| Combined | 84.7% | 88.9% | 87.0% | 91.1% | 88.6% | 90.9% | 88.9% | 91.2% |