

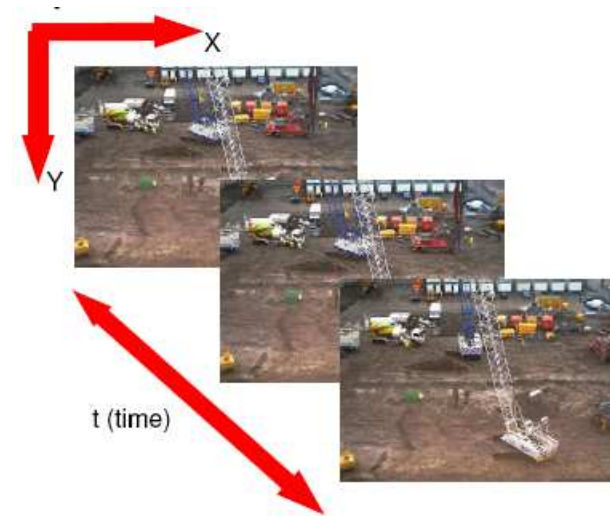
Detection and Tracking Introduction

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Detection and Tracking Introduction

Given a sequence of N images, is it possible to:

- Identify moving objects
- Predict their position in the next image

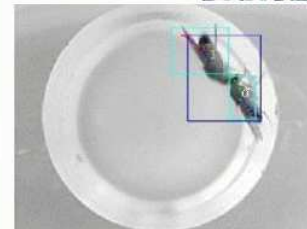


Goal: a sequence of tracked positions (r, c) for each target as it moves across the image

Data: a sequence of images (ie. a video)

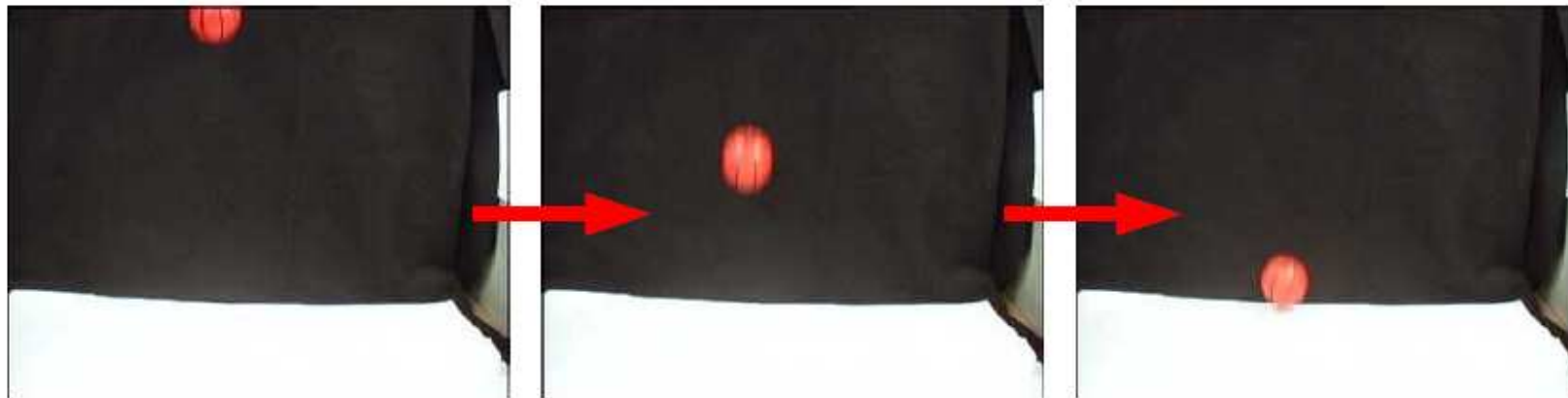
MOTIVATION

- Objects: human sign language recognition, vehicle monitoring
- People: overcrowding, sports, exclusion zones
- Animals: behaviour, health monitoring



TARGET TRACKING WITH NOISE AND BOUNCING

PROBLEM: track a ball falling and bouncing



SEE: [homepages.inf.ed.ac.uk/rbf/...](http://homepages.inf.ed.ac.uk/rbf/...AVINVERTED/DEMOS/TRACK/demo.html)
[...AVINVERTED/DEMOS/TRACK/demo.html](http://homepages.inf.ed.ac.uk/rbf/...AVINVERTED/DEMOS/TRACK/demo.html)

THE TARGET

PLAN:

1. Removal of irrelevant background +
detection of changes
2. Tracking noisy motion with **Kalman filter**
3. Coping with events and noise with
condensation tracking

Issues & Constraints

- + Constant background
- + Color difference with background: Realistic for controlled environments, less realistic for public places: plazas, streets, shopping areas
- + Newtonian motion model

Problems: Motion blur & the bounce

Why a ball?

- Ball bounce (direction, magnitude) is hard to model without precise knowledge of mass, forces, elasticity
- Prediction of $n + 1$ position using first n frames
- Simple shape allows us to concentrate on tracking issues without 3D shape problems



Other Targets?

We'll also look at tracking people indoors:



SEE: [homepages.inf.ed.ac.uk/rbf/...
...AVINVERTED/DEMOS/TRACK/demo2.html](http://homepages.inf.ed.ac.uk/rbf/...AVINVERTED/DEMOS/TRACK/demo2.html)

What We Have Learned

1. Some applications of tracking
2. Key steps: detection, track, motion modelling