Detection and Tracking Introduction

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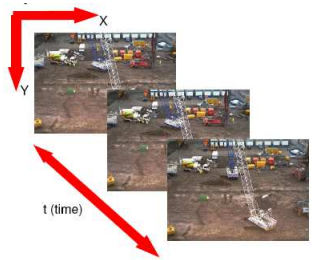
Given a sequence of N images, is it possible to:



- 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/...`
`...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`

What We Have Learned

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