Detection and Tracking Introduction

Robert B. Fisher
School of Informatics
University of Edinburgh

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

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

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

**Data:** a sequence of images (i.e., a video)

**MOTIVATION**

- Objects: human sign language recognition, vehicle
- 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 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
+ ? 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
• ? 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/rfb/... ...AVINVERTED/DEMOS/TRACK/demo2.html
What We Have Learned

1. Some applications of tracking

2. Key steps: detection, track, ?