Tracking, Learning, Re-Detection

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Abstract

Tracking is an enormously broad subject and methods differ in many aspects:

1. the way the appearance and shape of the tracked entity is modelled (ranging for a square patch of image intensities or a colour histogram to complex deformable models with many degrees of freedom),

2. whether the appearance and shape model is static, adaptive or learned on-line (and, in the latter case, the method of updating the model).

3. how the pose of the entity is established in a new frame: by local optimization, re-detection, regression or repeated segmentation

4. the representation of pose uncertainty (point estimate, or a distribution as in condensation)

5. the motion model and the pose prediction method

6. the capability to detect a tracking failure and recover from it

7. and more: background modelling, causality v. non-causality, modelling of dependencies of multiple motions, etc.

In the lecture we will present examples of tracking as local optimization, tracking as detection, tracking as regression, tracking as segmentation with differences in all aspects of tracking and will discuss their relative strengths and weakness.

We will focus on the following:
- how to use learning to be fast
- online learning, avoiding the drift and "one adaption to the background, and its over" problem
- detection tracking failure (as tracking always fails, sooner or later) and recovery from failure.
- methods of tracker robustification

Syllabus: Tracking, Learning, Re-Detection