Human body shape and pose from images

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Abstract

I will review the recent history in human pose estimation. The focus will be on methods to extract the 3D pose of the human body from single images, multiple calibrated images and image sequences. I will review traditional kinematic tree body models and Bayesian methods for tracking 3D bodies in image sequences. I will then focus on the harder problem of computing the 3D pose of a person from a single 2D image. Here I will review recent research on probabilistic graphical models of the body and non-parametric belief propagation for inferring body pose. Finally I will consider how we can go beyond human pose to estimate body shape as well. I'll describe recent work on extracting realistic graphics models of the body from images including monocular images. I will argue that extracting body shape an pose together can improve the estimate of pose and that having accurate body shape actually makes the problem simpler.

Syllabus:

1. review of traditional 3D body tracking
- *kinematic tree body models composed of rigid parts*
- *image likelihood measures*
- *Bayesian tracking algorithms*
- *evaluation of current state of the art*

2. 3D bodies from 2D pictures
- *addressing the initialization problem*
- *representation of the body as a graphical model*
- *non-parametric belief propagation for inference*
- *learning 3D pose from 2D pose*

3. body shape estimation
- *learning a statistical model of human shape*
- *fitting body shape and pose in multi-camera data*
- *estimating body shape and pose from shadows*
- *estimating body shape under clothing ('X-ray' vision)*
- *extracting the human body from a single image*