3D Human Body Tracking

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Recent Publications

Research Goal
- Recognize body motion and gestures for multimodal interactions
- A markerless, accurate body motion estimation

Research Approach
- Use of an articulated human model for constraining the physical structure of the human body and its movement.
- Particle filter-based tracking:
  - Integrate particle filter with analytical inference techniques: detection of body parts: head, hands and torso.
  - Infer analytically a subset of state parameters:
    - Reducing the degree of freedom
    - Automatic model initialization.
- Estimate unknown static parameters (i.e. height and shape) during tracking, using mixture Gaussians approach.

Role in IMSC
- User-state assessment from multimodal data
- Enabling technology for multimodal interactions
  - An alternative non-invasive human motion capture technology.
  - Understanding of human body structure and human movement.

Uniqueness & Related Work
- Recent works focused on improving efficiency using variance analysis, simulated annealing approach, partitioned sampling or hybrid Monte Carlo approach.
- Open problems:
  - large dimensional state space,
  - automatic initialization,
  - robustness of tracking.
- Contributions of this project:
  - Improved tracking efficiency and robustness.
  - Automatic initialization of body pose
  - Automatic estimation of human body shape: fitting the model to user's body proportions.

Accomplishments

5 Year Plan
- Improving the accuracy of the model for complex and ambiguous body motion
- Automatic gesture recognition from the spatio-temporal changes of the articulated model
- Automatic assessment of user state from its body language
- Extends the framework for tracking multiple interacting persons.