Recent Challenges in Computer Animation of Characters

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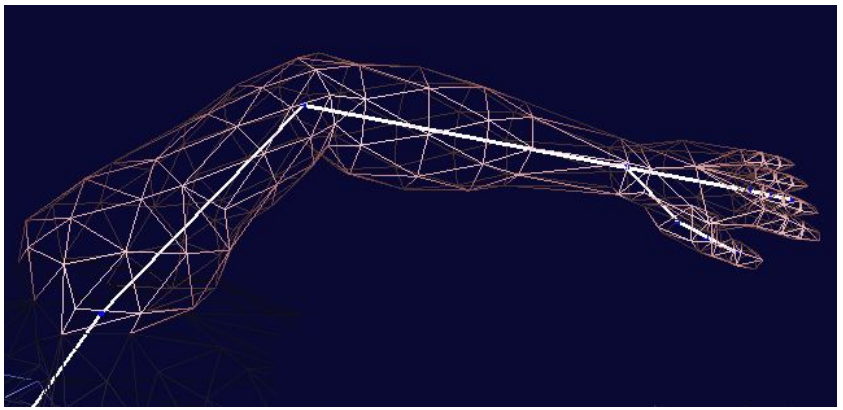
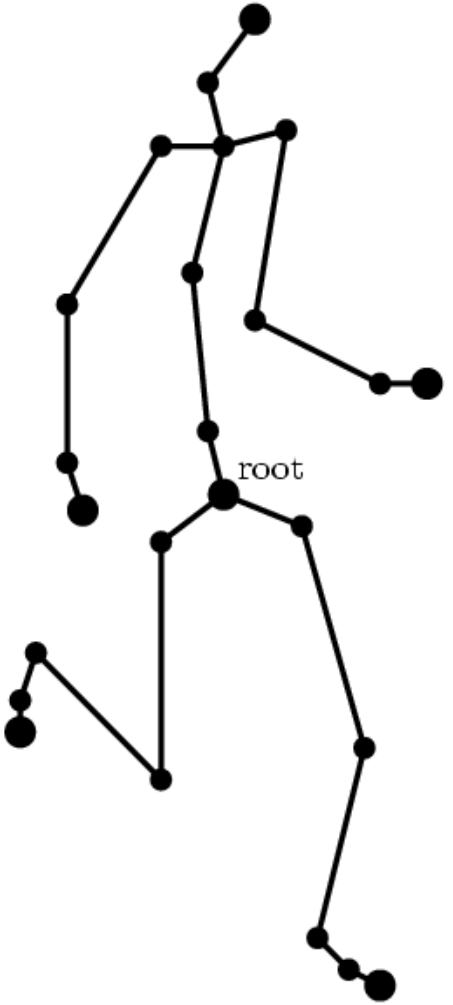
Overview

- Human body modeling
- Obtaining of a realistic motion
- Motion editing and reuse
- Motion library
- Conclusion & future work

Human Body Modeling

- abstraction: skeleton + skin
- articulated figure
  - approximation of a real skeleton
- skinning





How to Obtain a Realistic Motion?

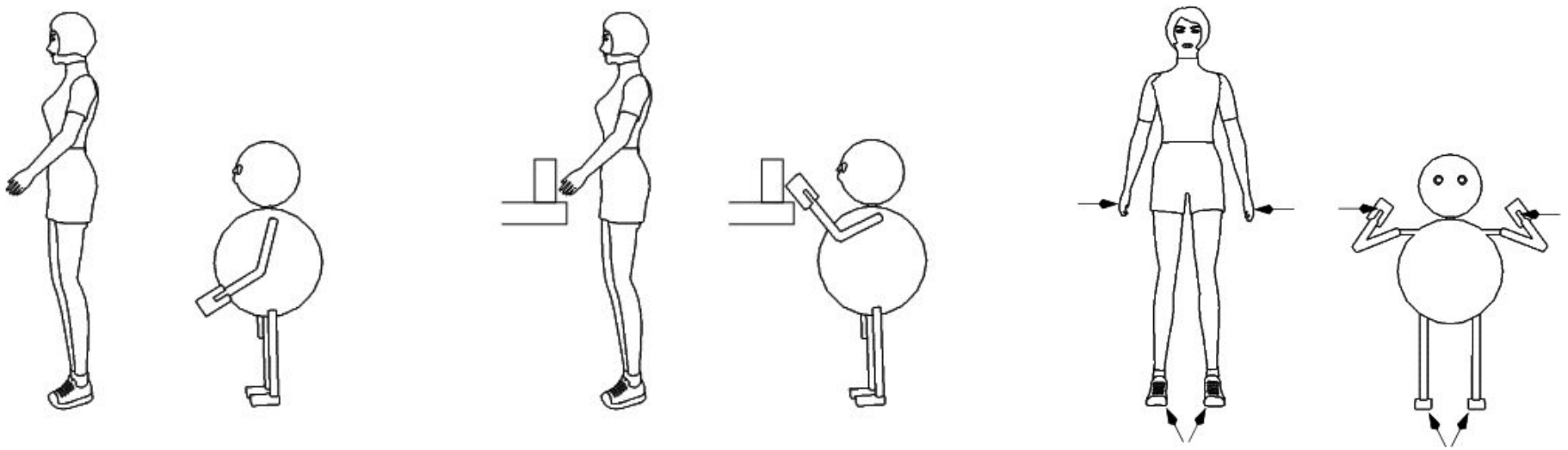
- keyframing, simulation, **motion capture**
- Motion capture
  - definition
  - technology
  - conversion to motion of the skeleton (joint orientations)
  - unique by naturalness and "aliveness" of the motion

Motion Editing and Reuse

- Why to edit a realistic motion?
- preserve an "essence" of the motion, alter outer properties
- motion as a signal
- specialized techniques
  - path editing, blending, retargeting

Motion Retargeting Problems

- adapt an existing motion to a character with different proportions
- Preserve j. angles or end-effector positions?



Shin et al. Computer Puppetry : An importance – based approach. ACM Transactions on Graphics, 20(2):67–94. 2001.

Motion Library

- motivation
  - extensive reuse of motion
  - specification of motion “by example”
  - free realistic motion in a virtual environment
- basic motions stored in a library
- search the library for a best-fit motion and adjust it
- more complex motions by concatenation, looping, blending (interpolation), ...

Motion Library – A Math. View

- character posture – a point in multi-dimensional space $\boldsymbol{P}$
- motion – a smooth curve in $\boldsymbol{P}$
- $\rightarrow$ motion graph
- motion library – analogy to a basis
  - independence, completeness
- techniques from algebra, approximation or databases may be used

Motion Record in the Library

- understanding and parametrization of motion
- motion "normalization" for storage in library
- structured motion record
  - body model
  - kinematic record of the motion
  - constraints for interaction with environment
  - parameters
  - attributes

Conclusion & Future Work

- synthesis of motion using a motion library – a recent and perspective trend
- a number of unanswered essential questions
- related tasks
  - understanding of motion – identification of constraints and parametrization
  - choice of elementary motions forming a basis
  - search for best-fit motion