SIGGRAPH Asia 2010
Preview

Curves Characters & Crowds
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Morphable Crowds

- Issue: control over crowd styles
  - challenging problem
  - cumbersome

- blending crowd animations into a new crowd
  - morphable crowd model
  - Multi-Way Blending
• morphable crowd model
  ◦ the distribution of neighborhood formations
  ◦ locomotion trajectories
- Formation distribution
• Trajectories model
  ◦ the trace of an individual for a short interval
  ◦ short segments are strung together

\[ d_{ij} = \| v_i^{\text{end}} - v_j^{\text{begin}} \| \]
Multi-Way Blending
Motion Fields for Interactive Character Animation

- Related work: Motions graphs
  - difficult to create graphs which allow very quick responses to changes of direction
  - difficult to couple these methods to physical simulators and other techniques

- a novel representation of motion data and control: motion fields
• motion fields

  ◦ instead of building a model of the most probable single motion
  ◦ model the set of possible motions at each character state

• motion state

\[ m = (x, v) = (x, x' \ominus x) \]

  ◦ a pair of successive poses \( x \) and \( x' \)
Motion Database
  ◦ Input as a set of motion capture data and constructs a set of motion states

Neighborhoods
  ◦ most similar motion states

\[
d(m, m') = \sqrt{\beta_\text{root} \left\| \nu_\text{root} - \nu'_\text{root} \right\|^2 + \beta_0 \left\| q_0(\hat{u}) - q'_0(\hat{u}) \right\|^2 + \sum_{i=1}^{n} \beta_i \left\| p_i(\hat{u}) - p'_i(\hat{u}) \right\|^2 + \sum_{i=1}^{n} \beta_i \left\| (q_i p_i)(\hat{u}) - (q'_i p'_i)(\hat{u}) \right\|^2}
\]
• Control using action weights

• Results
  ◦ Fast
  ◦ Easy to generate a new controller
  ◦ couple these methods to physical simulators

  ◦ motionfields_final.mov
Stable Inverse Dynamic Curves

- fit a smooth piecewise circular arcs curve to a sketched curve

- 2d dynamic curve at stable equilibrium under gravity
- based on the dynamic super-helix model [Bertails et al. 2006]

- two original algorithms
  - the geometric fitting with precise control of the resolution
  - the dynamic fitting with precise control of the stability
Video-based Reconstruction of Animatable Human Characters

- **Input:** multi-view video, mark-less

- **Output:**
  - animatable performance model
  - comprising a skeleton with surface skinning for non-cloth regions, collision proxies,
  - and a physics-based simulation model for apparel
• main contributions

◦ A new approach to capture plausible fully-animatable virtual humans from sparse video recordings

◦ An algorithm to automatically identify wavy cloth regions
• main contributions

- An algorithm to estimate plausible cloth simulation parameters
- A method to easily create new real-time animations