Data-driven Finger Motion Synthesis for Gesturing Characters

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Hand and Finger Movements

- integral and crucial part of language and communication
  [Kendon04, McNeill92]
- very hard to capture and often animated separately
  [Majkowska et al. 04] or only a few degrees of freedom are captured
  [Kitagawa and Windsor 08]

GreenDot Project, Williams et al. 10
How to Animate Fingers

- Motion capture
- Keyframe animation
- Algorithms
How to Animate Fingers

- Motion capture → not always accurate [Kahlesz et al. 2004], needs post-processing [Kitagawa and Windsor 2008]
- Keyframe animation
- Algorithms
How to Animate Fingers

• Motion capture

• Keyframe animation → time-consuming

• Algorithms
How to Animate Fingers

- Motion capture
- Keyframe animation
- **Algorithms** → rule-based [ElKoura03], physics-based [Pollard05, Liu09, Ye12], data-driven [Majkowska06]
Augmenting Body Motions with Finger Motions

Data-driven Finger Motion Synthesis

Database of Motions (Body and Hands)

Body Motion

Body + Hand Motion
Input Motion

Database
segment lengths between 0.33s and 2s
Method: Segmentation

[Graph showing speed in m/s over frames with labeled segments: preparation and stroke, post-stroke hold, retraction.]

Split 1 and Split 2 are indicated with vertical lines.
finding k most similar segments
What is the Best Similarity Metric?

Captured database with multiple similar gestures:
- 8 types of motions
- 8 examples for each type
- 2-4 valid segments per example
Total: 187 segments
What is the Best Similarity Metric?

Leave-one-out cross validation

correct = segment from the same type
What is the Best Similarity Metric?

Class confusion matrix

![Confusion Matrix Image]
shortest path: Dijkstra’s algorithm
shortest path: Dijkstra’s algorithm
compute transitions
Perceptual Experiment

8 clips x 3 motion types x 3 repetitions
14 participants
Limitations

No guarantee for correctness

No interaction handling

Adequate database necessary
Conclusion and Future Work

Method simple

Plausible results for many situations

Multiple results could be suggested based on user input