Dynamic Geometry Processing

EG 2012 Tutorial

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Overview

Speakers & Topics
Presenters

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Course Webpage

• Updated slides
• Literature & references
• Additional material / data sets

Linked from:
• http://www.mpi-inf.mpg.de/~mwand/
• Available next week
What we cover

Basics

• Motivation, data sources, problems
• Basic correspondence estimation techniques

Dynamic Geometry Registration

• Kinematic surfaces and geometric optical flow
• Incremental deformable matching
• Deformation graphs

Bringing it all together: State-of-the-art systems

• Example 1: *offline* tracking system for articulated models
• Example 2: *real-time* face tracking ("faceshift")
Data Sources

Where does all the data come from?
Deformable Shape Matching

New technology

• 3D animation scanners
• Record 3D video
• Active research area

Ultimate goal

• 3D movie making
• New creative perspectives

[P. Jenke, WSI/GRIS Tübingen]
Time-of-Flight / PMD Devices

PMD Time-of-flight camera

Minolta Laser Scanner (static)
Structured / Unstructured Light Scanners

- **space-time stereo**
  courtesy of James Davis, UC Santa Cruz

- **color-coded structured light**
  courtesy of Phil Fong, Stanford University

- **motion compensated structured light**
  courtesy of Sören König, TU Dresden
Going Mainstream

[Microsoft 2010]
Kinect Example Data
High-End Acquisition Setup: Lightstage

[Vlasic et al., Siggraph Asia 2009]
Lightstage Example Sequence

[Vlasic et al., Siggraph Asia 2009]
Problems & Topics
Processing Dynamic Geometry

Problems

• Noise, outliers
• Missing data
• No correspondences
• No semantics (joints, bones, expressions)

We discuss

• Establishing correspondences
• Reconstruction
  • Noise removal
  • Hole filling
• Data-driven priors
• Semantic rigging