Discrete Surface Processing

INTEGRATED MEDIA SYSTEMS CENTER
A National Science Foundation
Engineering Research Center at the
UNIVERSITY OF SOUTHERN CALIFORNIA

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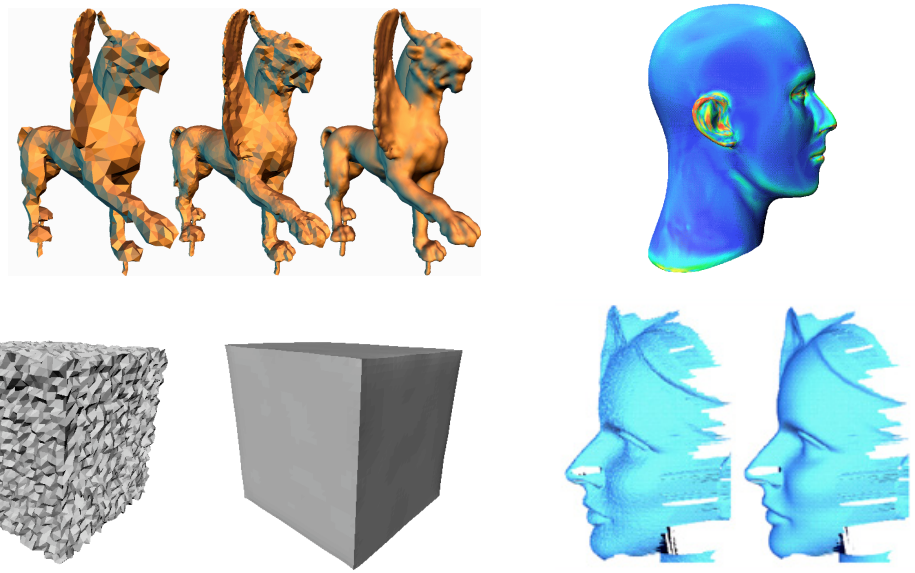

Adaptive semi-regular meshes, curvature approximation, and mesh denoising*:*

Examples of discrete surface processing applications.

USC STUDENTS, DEGREES

Haeyoung Lee (PhD student), Anna Kyrikou (MS)

OTHER RESEARCHERS, AFFILIATIONS

Peter Schröder (Professor at Caltech), Denis Zorin (Assistant Professor at NYU), Alan H. Barr (Professor at Caltech), Ron DeVore (Professor at South Carolina)

BRIEF DESCRIPTION OF DEMONSTRATION

Complete set of tools for the analyzing, editing, or manipulation of 3D meshes. This includes fast denoising techniques like implicit fairing, accurate discrete differential-geometry operators on irregular meshes, or remeshing techniques to provide the user with semi-regular meshes with good aspect ratio triangles. The overall goal of this research is to go from DSP (for signals such as music, images, video) to DGP, for 3D objects now.

UNIQUE OR DISTINGUISHING CHARACTERISTICS RELATIVE TO STATE-OF-THE-ART

Being able to handle arbitrary meshes as easily as a image, with guaranteed error bounds.

APPLICATIONS	RECENT HIGHLIGHTS, LEVEL OF DEVELOPMENT, UPCOMING MILESTONES
Mesh editing, automatic denoising of scanned meshes, irregular mesh handling, shape analysis, compression, etc.	We recently proposed an implicit fairing with mean curvature flow, extremely efficient to denoise an arbitrary mesh. We have developed a sound methodology to derive any differential quantity over a piece-wise linear arbitrary mesh. We will provide a realtime remeshing engine soon.

UNDERLYING TECHNOLOGIES

- Implicit fairing, for fast, yet robust denoising.
- Curvatures approximations over arbitrary meshes.
- Smooth parameterization for any 2-manifold
- Realtime remeshing

LIST OF PUBLICATIONS, REFERENCES, URLs

Mathieu Desbrun, Mark Meyer, Peter Schröder, Alan Barr, *Implicit Fairing of Arbitrary Meshes with Diffusion and Curvature flow*, ACM SIGGRAPH'99.
Mathieu Desbrun, Mark Meyer, Peter Schröder, Alan Barr, *Anisotropic Feature-Preserving Denoising of Bivariate Data*, Graphics Interface '00.
Mathieu Desbrun, Mark Meyer, Peter Schröder, Alan Barr, *Discrete Differential-Geometry Operators for 3D Meshes*, in preparation.

Check out: http://www-grail.usc.edu/

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