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ENGINEERING RESEARCH CENTER

media communications

Progressive Transmission of Textured Graphic Models over IP Networks

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Research Goal

- Optimal rate-distortion performance in progressive transmission / rendering of textured 3D models
  - A uniform distortion metric
  - Optimal bitrate allocation between texture and mesh data
- Deal with changing viewing parameters
  - Viewing point / distance / angle

Role in IMSC

- Facilitates browsing of graphic models via wired and wireless channels
  - Reduce the initial waiting time
  - Best quality with limited bandwidth
- The quality metric can be used to control QoS of walkthrough virtual environments

Research Approach

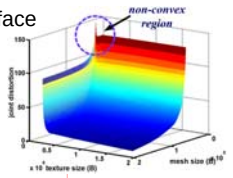
- Distortion uniformly measured with help of 2D rendered images
- Fixed viewpoint
  - Rate-distortion surface calculated
  - Optimal path found over the rate-distortion surface
- Changing viewpoints
  - Optimal path interpolated

Accomplishments

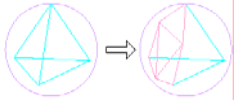
- Optimal rate-distortion performance compared with other strategies
- Highly accurate optimal path interpolation for changing viewpoints
- Publications
  - "Optimized Mesh and Texture Multiplexing for Progressive Textured Model Transmission", submitted to *ACM Multimedia*, 2004.
  - "Progressive Coding of 3D Textured Graphic Model via Joint Mesh-Texture Optimization", *IEEE ICASSP*, 2004.
  - "Joint Mesh-Texture Optimization for Progressive Transmission", *Proc. SPIE VCIP*, 2004.

Uniqueness & Related Work

- Rate-distortion surface



- Viewing mesh



5-Year Plan

- Geometry-driven progressive mesh encoding
  - Geometry compression through space partitioning
  - Quantization / Remeshing guided by rate-distortion optimization
- Progressive rendering of textured 3D models at low end systems