VISUAL ANALYSIS
OF TRABECULAR BONE STRUCTURE

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Image Data

z micro-CT
  y Voxel size down to 15μ
  y Matrix size up to $1024^3$

Large main memory needed or out-of-core processing
Tasks

- Quantitative analysis, e.g.
  - BV/TV
  - Mean grey value
  - Local thickness
  - More advanced measures

- Visualization
  - Interactive frame rates
  - Overall structure
  - Measures
Basic Visualization

Slicing  Volume rendering  Isosurface
Basic Visualization

- **Slicing**
  - Fast at full resolution
  - Hard to realize 3D structure
  - No preprocessing → reference

- **Volume rendering**
  - Downsampled (here 8x8x4 = 256)

- **Isosurface**
  - 10,000,000 triangles at full resolution
  - Downsampled only

High resolution & 3D structure?
Advanced Visualization

- Medial surface (skeleton)
  - Overall structure
  - Interactive frame rates
- Color coding
  - Local measures
  - Highlight special features
Skeletonization

- Segmentation
- Voxel skeleton
- Triangulation
- Triangle reduction
- Integrated into Amira
Colored by mean CT value
Colored by local thickness
Conclusions

- Interactive visualization of high resolution images of bone biopsies possible
- Overall structure together with local measures points to special features
- Interactive exploration useful
Future

- Visualization of rod-like structures
- Out-of-core processing

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Thank you...

... for your attention.

Questions?
Colored by local thickness
Colored by local thickness

BV/TV 20%
BV/TV 15%
BV/TV 9.5%
Skeletonization

- Segmentation
- Voxel skeleton
- Triangulation
- Triangle reduction