Seg3D Update
3D Image Segmentation Tool

- Layers and tools (a la Photoshop)
- Many ITK-based filters
  - Convention for wrapping/integration
- In-house platform for low-level, user-aided image processing
  - Testing and releasing new algorithms/interfaces
  - Delivering custom capabilities to specific applications
Splash Screen: Projects

Seg3D 2.1

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Tools, Layers and Viewers
Measurements

[Image of a computer screen showing a medical imaging software with measurements highlighted, including a length of 15.056 labeled as 'Interocular'.]
Provenance Record
Volume Visualization
Architecture of Seg3D: Layered Approach

User Interface Layer (namespace Seg3D): Main Window, Menus, Tool Interfaces, Dialogs

QtUtils (namespace QtUtils)
Custom Widgets, Link to StateEngine, OpenGL Linkage

Application Logic Layer (namespace Seg3D)
Application Logic, Filters, Layers, LayerManager, Tools, Importers/Exporters, Slice/Scene renderer

Core Logic Layer (namespace Core)
Cleaned up classes from SCIRun (Geometry/Math/String Utilities), Data Volumes, State Management, Action Management, Core Renderer, Textures/Shader containers

Externals: 3rd party libraries
- boost: threads, callbacks, lambda, signals/slots, sockets, filenames, file I/O
- itk: filters, image file format, teem: nrrd format, resampling
- gdcmm: custom-dicom support, libpng/zlib/MatlabIO/hdf5: image file format
- tinyxml: XML support, sqlite: provenance database
- glew: OpenGL bindings, freetype: OpenGL text rendering
- python: Built-in python interpreter
Seg3D – Completing the Transition

• Fall 2011: Numira -> SCI handoff
• Since Oct 2011...
  o Bugs
    - 32 reported
    - 21 closed
    - 11 open
  o Features
    - 11 requested
    - 2 completed
    - 9 open
Seg3D – Agenda

• Josh C. – Collaboration examples
• Ross W. – Future
Future of Seg3D

• Integrate other techniques
  o Needs of users/DBPs
  o Leveraging other projects/centers

• Continue to support/refine

• Extend basic capabilities
  o User needs
  o New “niche markets”
Seg3D – Leveraging

- LA segmentation from DCE-MRI
  - Supported by NAMIC
  - Optimal surfaces via graph cuts (Veni and Whitaker)
CALL FOR PARTICIPATION

ISBI 2012 Challenge Workshop

Cardiac Delayed Enhancement Magnetic Resonance Image Segmentation
cDEMRSIS
Statistical Atlases and Computational Models of the Heart
• Fast user-guided segmentation algorithms.

• Loop until a satisfactory result

• User refines constraints on voxels
Constrained Spectral Clustering

Constraints for pairs of voxels: “must-link” or “cannot-link”
Constrained Spectral Clustering

Unconstrained Spectral clustering on a 200-point dataset

Constraints:
10 must-links
10 cannot-links

Constrained Spectral Clustering
Seg3D Plans

• Documentation (ongoing)
  • Filters
  • Tools
  • New tutorials
• Machine learning
• More robust python interface
• Large data (out of core)
• Multi channel data
• More ITK filter integration