GPU Panel for Medicine
Computing on GPUs for Biomedical Science and Clinical Practice

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Early GPU(like) computing

1984 – CPU – 2 hours

1986 – PxPl4 – 30 msec
Reconstruction and Rendering

1994 Cabral, Cam, Foran

1. Introduction
2. Background – The Radon and Inverse Radon Transform
   2.1. Orthographic volume rendering and the generalized Radon Transform
   2.2. Fan beam reconstruction
3. Three Dimensional reconstruction and rendering
   3.1 Cone Beam Reconstruction
   3.2. Perspective Volume Rendering using the Generalized Radon Transform
4. Computational complexity
   4.1. FTT and filtering complexity
   4.2. Back projection and Radon transform complexity
5. A texture map based reconstruction algorithm
6. Texture mapped volume rendering
7. Performance results
8. Future directions and conclusions
9. Acknowledgements

2009 – NLM VHP VolRen
Insight Toolkit (ITK)

An open-source software toolkit for performing image analysis, registration, and segmentation

Collection of over 1500+ filters and algorithms for medical image processing

Examples:

- Interactive watershed segmentation
- Viola-Wells: Mutual Information registration
- Osher-Sethian: Level set segmentation framework
ITKv4: Accelerate

- Reader (CPU)
- Filter1 (GPU)
- Filter2 (GPU)
- Filter3 (CPU)
- Writer (CPU)

- Example: Anisotropic Diffusion Filter
- One GPU was up to 45 times faster than 1-8 CPUs
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