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Degrees

2004 Ph.D. in Computer Science, The University of North Carolina at Chapel Hill
Thesis: *Deformable Solid Modeling via Medial Sampling and Displacement Subdivision*, Dr. Stephen M. Pizer, advisor

1997 M.S. in Computer Science, The University of North Carolina at Chapel Hill
Document and Code Product: *Shapemonger: An Extensible Tool for Interactive Study of Differential Geometry of Surfaces in* $\mathbb{R}^3$

1984 B.A. in Mathematics, Kalamazoo College.

Experience

August 2002 – present	Assistant Professor at Allegheny College Department of Computer Science
January 1995 – May 2004	Research Assistant at UNC-Chapel Hill Departments of Computer Science and Radiation Oncology
January 1993 – December 1998	Teaching Assistant and Instructor at UNC-Chapel Hill Department of Computer Science

Goals and Interests

I seek a professional position, corporate or academic, that will allow me to pursue research interests in computer graphics and visualization, image analysis, and numerical computing. I am intrigued especially by possibilities of advanced GPUs and other new architectures for graphics, image analysis and scientific computation. Skilled as a programmer—both low-level, hardware-targeted coding and higher-level application and library-building—as a teacher, and as a researcher in visual and geometric computation.

Research Background

GPU/GPGPU Applications: implemented libraries and test applications for extended-precision computation on programmable graphics hardware. Currently working to guarantee numerical accuracy and to implement discrete Fourier transforms in extended precision.

Geometric Modeling for 3D Medical Image Analysis: designed deformable multifigure models based on sampled medial axes and medial-parameterized subdivision boundaries. These hierarchical *medial figures* allow statistical analysis of shape variation and deformation to match 3D-image-data using coarse-to-fine refinement based on statistical priors.

Radiotherapy Portal Image Registration: created realtime image-analysis software for use in clinical application for radiation-treatment planning. This involved SIMD parallel and optimized sequential programming, and applied scale-space methods and multiscale medial axes to portal-image radiograph registration.

Research Background (continued)

Other Areas of Research and Study: Monte Carlo solution of linear systems, statistical pattern recognition, numerical solution of PDEs, computational number theory, physically-based modeling and simulation, image-based rendering, interactive graphics programming, game-engine design, and methods for teaching computer programming and computer graphics to children.

Teaching Methodology: collaboratively, restructured an undergraduate computer science program to better prepare students for careers in science. Jointly developed new software technologies for interactive classroom teaching as well as new curricula for introductory courses, advanced theory courses, and thesis-directed junior and senior research seminars.

Software Products

The df64, cdf64, and qf128 libraries: Cg-based code for extended-precision GPU computation using pairs or quadruples of single-precision floating point numbers. Includes extended-precision code for `log(x)`, `exp(x)`, and trigonometric functions.

Seurat: a library to create sampled medial skeleta and interpolate boundaries using modified Catmull-Clark subdivision surfaces with boundary displacements. Seurat does medial-based remeshing of figure-subfigure joins and enables figure-based object morphing. Part of the **Pablo** project , a 3D image registration, segmentation, and shape-analysis tool developed by the Medical Display and Analysis Group (MIDAG) at UNC–Chapel Hill.

Shapemonger: extensible tool for studying and implementing projects on the differential geometry of surfaces. Written in C++, OpenGL, and FLTK, with custom equation-parsing code and numerical library. Windows or Unix/Linux. In use for more than a decade at UNC–Chapel Hill.

FliesEyes/XInteract: Collaborated on and co-supervised development of Linux-based tools for use in "smart" classrooms. Allows students to perform coding exercises during lecture, with databased problem-sets and statistics on student success and with networked desktop coordination enabling instructor and class viewing and interaction.

Computational Skills and Experience

Programming languages:
- C, C++, and Java; scripting with sed, awk, Python, Icon/Unicon; x86 assembly (NASM)

Scientific computing:
- Mathematica (with Image Processing Toolkit), Matlab, J, Common Lisp, Scheme
- GNU Scientific Library (GSL) and Multiprecision Library (GMP), other numerical libraries

Graphics and image-based programming:
- OpenGL programming, including extensions and OpenGL Version 2 features
- GPU programming: Cg, ARB fragment programming, familiarity with Brook and Sh
- VTK, FreeImage, /usr/Image, OpenAL

User-interface programming:
- in C++ with GLUT, GLUI, and FLTK
- in Java with AWT and Swing.

Distributed and parallel programming:
- PVM, Javaspaces, multiprogramming on MasPar MP-1 and 32-node SGI InfiniteReality

Operating Systems, development and production environments:
- Windows XP: Visual C++ 6.0/2003.NET, Eclipse, NetBeans for Java
- Unix/Linux/Cygwin X Windows: GNU compilers, development, debugging, resource control tools
- LaTeX document creation, Microsoft Word/Excel/Powerpoint

Computer graphics modeling, rendering, animation, and game design:
- 2D: Adobe Photoshop, Paintshop Pro, Toon Boom Studio, GIMP, ImageMagick, xfig
- 3D: Maya Ultimate 6.0, AC3D, Rhino3D, Renderman (BMRT), POV-Ray, Alice
- Game engines: Wild Magic, Ogre, Fly3D, GameMaker

Selected Publications and Professional Activities

Refereed Journals

Stephen M. Pizer, P. Thomas Fletcher, Sarang Joshi, A. Graham Gash, Joshua Stough, Andrew Thall, Gregg Tracton, and Edward L. Chaney. A method and software for segmentation of anatomic object ensembles by deformable m-reps. *Medical Physics*, 32(5):1335–1345, May 2005.

Stephen M. Pizer, P. Thomas Fletcher, Sarang Joshi, Andrew Thall, James Z. Chen, Yonatan Fridman, Daniel S. Fritsch, A. Graham Gash, John M. Glotzer, Michael R. Jiroutek, Conglin Lu, Keith E. Muller, Gregg Tracton, Paul Yushkevich, and Edward L. Chaney. Deformable m-reps for 3D medical image segmentation. *Int. J. Comput. Vision*, 55(2-3):85–106, 2003.

Sarang C. Joshi, Stephen M. Pizer, P. Thomas Fletcher, Paul A. Yushkevich, Andrew Thall, and J. S. Marron. Multi-scale deformable model segmentation and statistical shape analysis using medial descriptions. *IEEE Transactions on Medical Imaging (TMI)*, 21(5):538–550, May 2002.

D. Fritsch, E. Chaney, A. Boxwala, M. McAuliffe, S. Raghavan, A. Thall, and J. Earnhart. Core-based portal image registration for automatic radiotherapy treatment verification. *International Journal of Radiation Oncology, Biology, Physics; Special Issue on Conformal Therapy*, 5(33):1287–1300, 1995.

Conference Papers and Presentations

Andrew Thall. Extended-precision floating-point numbers for GPU computation. Poster at ACM SIGGRAPH Annual Conference on Computer Graphics (SIGGRAPH 06), Boston, Mass., July 30–August 3, 2006.

Andrew Thall and Robert Cupper, An Infrastructure and Pedagogy to Support Interactive Teaching of Computer Science. Invited talk at the *Liberal Arts Computer Science Consortium Annual Meeting (LACS'05)*. Rochester Institute of Technology, NY, August 12, 2005.

Matthew J. Rummel, Gregory M. Kapfhammer, and Andrew Thall. Towards the prioritization of regression test suites with data flow information. In *SAC '05: Proceedings of the 2005 ACM Symposium on Applied Computing*, pages 1499–1504, New York, NY, USA, 2005. ACM Press.

Joseph Zumpella and Andrew Thall. Texture synthesis using reaction-diffusion systems and genetic evolution. Poster at ACM SIGGRAPH Annual Conference on Computer Graphics (SIGGRAPH 04), Los Angeles, August 2004.

Sarang C. Joshi, Stephen M. Pizer, P. Thomas Fletcher, Andrew Thall, and Gregg Tracton. Multi-scale 3-D deformable model segmentation based on medial description. In *IPMI '01: Proceedings of the 17th International Conference on Information Processing in Medical Imaging*, pages 64–77, London, UK, 2001. Springer-Verlag.

Book Chapters

S. Pizer, Q. Han, S. Joshi, P. T. Fletcher, P. A. Yushkevich, and A. Thall, "Synthesis, Deformation, and Statistics of 3D Objects via M-Reps," in *Medial Representations: Mathematics, Algorithms and Applications*, K. Siddiqi and S. Pizer, Eds., Kluwer Academic Publishers, 2006, Ch. 8, In Press.

Grants, Honors, and Awards

2003 – present	"Teaching Computing in the 21^{st} Century." A *Buhl Foundation* grant to the Allegheny Department of Computer Science of $50,000 to support new pedagogy and software development for interactive teaching. (Dr. Robert Cupper, PI)
1999 – 2000	"M-reps: Deformable Solid Modeling for Computer Graphics and Simulation using Medially-Defined Multifigural Objects." *NSF SGER (Special Grant for Exploratory Research)* CCR-9910419, $44,000 to fund dissertation work. (Dr. Stephen Pizer, PI)
1998 – 2002	Support from NIH Grant P01-CA47982
1997 – 1998	Link Foundation Fellowship to support thesis research on deformable medial models
1980 – 1984	F.W. & Elsie Heyl Scholarship, four-year math/science scholarship

Curriculum Vitae

Full C.V. available online: `http://cs.allegheny.edu/~thall/papers/ThallVita.pdf`.

Professional References

Available on request.

August, 2006