

CURRICULUM VITAE

P. THOMAS FLETCHER

ADDRESS

Warnock Engineering Building
72 South Campus Central Dr., Room 4686
University of Utah
Salt Lake City, Utah 84112

Email: fletcher@sci.utah.edu
Web: www.sci.utah.edu/~fletcher
Phone: (801) 587-9641

EDUCATION

- 2004 Ph.D. in Computer Science
University of North Carolina at Chapel Hill
Statistical Variability in Nonlinear Spaces: Application to Shape Analysis and DT-MRI
- 2002 M.S. in Computer Science
University of North Carolina at Chapel Hill.
- 1999 B.A. in Mathematics
University of Virginia.
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RESEARCH EXPERIENCE

- 11/2005– **Research Assistant Professor.** School of Computing, University of Utah.
Conducted research and advised students in DT-MRI filtering, interpolation, and registration. Currently focused on white matter path analysis in DT-MRI and longitudinal analysis of anatomical shape, with applications in Alzheimer's Disease and Autism research.
- 2004–2005 **Postdoctoral Research.** Scientific Computing and Imaging Institute, University of Utah. *Advisor:* Ross Whitaker.
Developed a continuous, PDE-based shape metric that prevents object self-intersections. Conducted research in statistical group comparisons of diffusion tensor data.
- 1999–2004 **Graduate Research Assistant.** Computer Science Department, University of North Carolina. *Advisor:* Stephen M. Pizer.
Conducted research in statistical shape analysis, segmentation by deformable models, medial axis geometry, DT-MRI analysis, and other related areas. Worked on a team as a primary developer of Pablo, a software tool for

modeling and segmenting anatomy in medical images using medial representations.

1998–1999 **Undergraduate Research Assistant.** Computer Science Department, University of Virginia. *Advisor:* John C. Knight.
Conducted research in formal methods. Worked on a software team developing Zeus, a tool for writing software specifications in the formal language Z.

TEACHING EXPERIENCE

2002 **Instructor.** Computer Science Department, University of North Carolina. Taught undergraduate introductory programming course. Had full responsibility of lectures, assignments, tests, and grading.

1997–1998 **Teaching Assistant.** Computer Science Department, University of Virginia. Graded homework and held office hours to answer student questions for undergraduate courses in discrete math and data structures.

STUDENTS ADVISED

Saurav Basu, M.S.

Masters Student, 2005-2006

Thesis: *Rician Noise Removal in Diffusion Tensor MRI*

Ran Tao

Ph.D. Candidate, 2006-present

Currently working in DTI registration and analysis of white matter pathways.

PUBLICATIONS

Book Chapters

Fletcher, P.T., Pizer, S.M., Joshi, S.C. Shape Variation of Medial Axis Representations via Principal Geodesic Analysis on Symmetric Spaces. In *Statistics and Analysis of Shapes*, chp. 2, pp. 29–60, eds. H. Krim and A. Yezzi, Birkhauser, 2006.

Journal Papers

Davis, B., Fletcher, P.T., Bullitt, E., Joshi, S. Population shape regression from random design data, to appear *International Journal of Computer Vision*, **Marr Prize Special Issue**, 2008.

Jurus, E., Hardy, M., Tasdizen, T., Fletcher, P.T., Koshevoy, P., Chien, C.-B., Denk, W., Whitaker, R. Axon tracking in serial block-face scanning electron microscopy, to appear

Medical Image Analysis, 2008.

Foster, N.L., Wang, A.Y., Tasdizen, T., Fletcher, P.T., Hoffman, J.M., Koeppe, R.A. Realizing the potential of positron emission tomography with ^{18}F -fluorodeoxyglucose to improve the treatment of Alzheimer's disease, *Alzheimer's and Dementia*, vol. 4, no. 1, suppl. 1, pp. S29–S36, 2008.

Jeong, W.-K., Fletcher, P.T., Tao, R., Whitaker, R.T. Interactive visualization of volumetric white matter connectivity in diffusion tensor MRI using a parallel-hardware Hamilton-Jacobi solver, *IEEE Transactions on Visualization and Computer Graphics (Proceedings of IEEE Visualization)*, vol. 13, no. 6, pp. 1480–1487, 2007.

Fletcher, P.T., Joshi, S. Riemannian Geometry for the Statistical Analysis of Diffusion Tensor Data, *Signal Processing*, vol. 87, no. 2, pp. 250–262, 2007.

Corouge, I., Fletcher, P.T., Joshi, S., Gouttard, S., Gerig, G. Fiber tract-oriented statistics for quantitative diffusion tensor MRI analysis, *Medical Image Analysis*, vol. 10, no. 5, pp. 786–798, 2006.

Pizer, S.M., Fletcher, P.T., Joshi, S., Gash, A.G., Stough, J., Thall, A., Tracton, G., Chaney, E.L. A Method and Software for Segmentation of Anatomic Object Ensembles by Deformable M-reps, *Medical Physics*, vol. 32, no. 5, pp. 1335–1345, 2005.

Fletcher, P.T., Lu, C., Pizer, S.M., Joshi, S. Principal Geodesic Analysis for the Nonlinear Study of Shape. *IEEE Trans. on Medical Imaging*, vol. 23, no. 8, pp. 995–1005, 2004.

Pizer, S.M., Fletcher, P.T., Joshi, S., Thall, A., Chen, J.Z., Fridman, Y., Fritsch, D.S., Gash, A.G., Glotzer, J.M., Jiroutek, M.R., Lu, C., Muller, K.E., Tracton, G., Yushkevich, P., Chaney, E.L. Deformable M-Reps for 3D Medical Image Segmentation. *International Journal of Computer Vision*, vol. 55, no. 2, pp. 85–106, 2003.

Yushkevich, P., Fletcher, P.T., Joshi, S., Thall, A., and Pizer, S.M. Continuous Medial Representations for Geometric Object Modeling in 2D and 3D, *Image and Vision Computing*, vol. 21, no. 1, pp. 17–28, 2003.

Pizer, S.M., Fletcher, P.T., Thall, A., Styner, M., Gerig, G., and Joshi, S. Object Models in Multiscale Intrinsic Coordinates via M-reps, *Image and Vision Computing*, vol. 21, no. 1, pp. 5–15, 2003.

Joshi, S., Pizer, S.M., Fletcher, P.T., Yushkevich, P., Thall, A., and Marron, J.S., Multi-scale Deformable Model Segmentation and Statistical Shape Analysis Using Medial Descriptions, *IEEE Transactions on Medical Imaging*, pp. 538–550, 2002.

Conference Papers

Fletcher, P.T., Venkatasubramanian, S., Joshi, S. Robust statistics on Riemannian manifolds via the geometric median, to appear *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2008.

Cates, J., Fletcher, P.T., Warnock, Z., Whitaker, R. A shape analysis framework for small animal phenotyping with application to mice with a targeted disruption of HoxD11, to appear *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2008.

Oguz, I., Cates, J., Fletcher, P.T., Whitaker, R., Cool, D., Aylward, S., Styner, M. Entropy-based particle systems and local features for cortical correspondence optimization, to appear *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2008.

Davis, B., Fletcher, P.T., Bullitt, E., Joshi, S. Population shape regression from random design data, *IEEE International Conference on Computer Vision (ICCV)*, **Winner of David Marr Best Paper Award**, October, 2007.

Jeong, W.-K., Fletcher, P.T., Tao, R., Whitaker, R.T. Interactive visualization of volumetric white matter connectivity in diffusion tensor MRI using a parallel-hardware Hamilton-Jacobi solver, *IEEE Visualization*, October, 2007.

Goodlett, C., Fletcher, P.T., Lin, W., Gerig, G. Quantification of Measurement Error in DTI: Theoretical Predictions and Validation, *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, October, 2007.

Fletcher, P.T., Tao, R., Jeong, W.-K., Whitaker, R.T., A Volumetric Approach to Quantifying Region-to-Region White Matter Connectivity in Diffusion Tensor MRI, In *Information Processing in Medical Imaging (IPMI)*, LNCS 4584, pp. 346–358, 2007.

Fletcher, P.T., Powell, S., Foster, N.L., Joshi, S.C. Quantifying Metabolic Asymmetry Modulo Structure in Alzheimer's Disease, In *Information Processing in Medical Imaging (IPMI)*, LNCS 4584, pp. 446–457, 2007.

Cates, J., Fletcher, P.T., Styner, M., Shenton, M., Whitaker, R. Shape Modeling and Analysis with Entropy-Based Particle Systems, In *Information Processing in Medical Imaging (IPMI)*, LNCS 4584, pp. 333–345, 2007.

Basu, S., Fletcher, P.T., Whitaker, R.T. Rician Noise Removal in Diffusion Tensor MRI. In *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, LNCS 4190, pp. 117–125, October, 2006.

Fletcher, P.T., Whitaker, R.T. Riemannian Metrics on the Space of Solid Shapes, In *Workshop on Mathematical Foundations of Computational Anatomy, MICCAI*, October, 2006.

Cates, J., Meyer, M., Fletcher, P.T., Whitaker, R.T. Entropy-Based Particle Systems for Shape Correspondence, In *Workshop on Mathematical Foundations of Computational Anatomy, MICCAI*, October, 2006.

Jurrus, E., Tasdizen, T., Koshevoy, P., Fletcher, P.T., Hardy, M., Chien, C-B., Denk, W., Whitaker, R.T. Axon Tracking in Serial Block-Face Scanning Electron Microscopy, In *Workshop on Microscopic Image Analysis with Applications in Biology, MICCAI*, October, 2006.

Corouge, I., Fletcher, P.T., Joshi, S., Gilmore, J.H., Gerig, G. Fiber Tract-Oriented Statistics for Quantitative Diffusion Tensor MRI Analysis. In *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, pp. 671–679, 2005.

Dam, E., Fletcher, P.T., Pizer, S.M., Tracton, G., Rosenman, J. Prostate Shape Modeling based on Principal Geodesic Analysis Bootstrapping. In *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, pp. 1008–1016, 2004.

Fletcher, P.T., Joshi, S. Principal Geodesic Analysis on Symmetric Spaces: Statistics of Diffusion Tensors. Presented at *ECCV 2004 Workshop on Computer Vision Approaches to Medical Image Analysis (CVAMIA)*, LNCS 3117, Springer-Verlag, pp. 87–98, 2004.

Fletcher, P.T., Joshi, S., Lu, C., Pizer, S.M. Gaussian Distributions on Lie Groups and Their Application to Statistical Shape Analysis. In *Information Processing in Medical Imaging (IPMI)*, pp. 450–462, 2003.

Fletcher, P.T., Lu, C., Joshi, S. Statistics of Shape via Principal Geodesic Analysis on Lie Groups. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pp. 95–101, 2003.

Fletcher, P.T., Pizer, S.M., Gash, A.G., Joshi, S. Deformable M-rep Segmentation of Object Complexes. In *IEEE International Symposium on Biomedical Imaging (ISBI)*, pp. 26–29, 2002.

Pizer, S.M., Joshi, S.C., Fletcher, P.T., Styner, M., Tracton, G., Chen, J.Z. Segmentation of Single-Figure Objects by Deformable M-reps. In *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, pp. 862–871, 2001.

Joshi, S.C., Pizer, S.M., Fletcher, P.T., Thall, A., Tracton, G. Multi-scale 3-D Deformable Model Segmentation Based on Medial Description. In *Information Processing in Medical Imaging (IPMI)*, pp. 64–77, 2001.

Abstracts and Short Papers

Fletcher, P.T., Wang, A. Y., Tasdizen, T., Chen, K., Jagust, W.J., Koeppe, R.A., Reiman, E.M., Weiner, M.W., Minoshima, S., Foster, N.L. Variability of Normal Cerebral Glucose Metabolism from the Alzheimer’s Disease Neuroimaging Initiative (ADNI): Implications for Clinical Trials, *Annals of Neurology*, vol. 62, issue S11, October 2007.

Goodlett, C., Fletcher, P.T., Lin, W., and Gerig, G. Noise-induced Bias in Low-direction Diffusion Tensor MRI: Replication of Monte-Carlo Simulation with In-vivo Scans. *International Society for Magnetic Resonance in Medicine (ISMRM)*, 2007.

Chaney, E., Pizer, S., Joshi, S., Broadhurst, R., Fletcher, P.T., Gash, G., Han, Q., Jeong, J.Y., Lu, C., Merck, D., Stough, J., Tracton, G., Bechtel, J., Rosenman, J., Chi, Y.Y., and Muller, K. Automatic Male Pelvis Segmentation from CT Images via Statistically Trained Multi-Object Deformable M-rep Models, *American Society for Therapeutic Radiology and*

Oncology (ASTRO), 2004.

Fletcher, P. T., Lu, C., Yushkevich, P., Joshi, S., Pizer, S.M. A Statistical Framework for Analyzing Shapes of Anatomic Structures. *18th Annual Radiology Research Symposium, University of North Carolina at Chapel Hill*, page 29, 2003.

Knight, J.C., Fletcher, P.T., Hicks, B.R. Tool Support for Production Use of Formal Techniques. In *World Congress on Formal Methods*, page 1854, 1999.

HONORS AND AWARDS

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| 2007 | Winner of David Marr Best Paper Prize, ICCV 2007. |
| 2003 | Runner-up for Francois Erbsmann Prize, IPMI 2003. |
| 2003 | Best Paper, 18th Annual Radiology Research Symposium, University of North Carolina at Chapel Hill. |
| 1995–1999 | Echols Scholar, University of Virginia. |