

# CURRICULUM VITAE

P. THOMAS FLETCHER

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## ADDRESS

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

Email: [fletcher@cs.utah.edu](mailto:fletcher@cs.utah.edu)  
Web: [www.cs.utah.edu/~fletcher](http://www.cs.utah.edu/~fletcher)  
Phone: (801) 587-9641

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## 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

- 7/2008–    **Assistant Professor.** School of Computing, University of Utah.  
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.
- 2005–2008    **Research Assistant Professor.** School of Computing, U. of Utah.  
Conducted research and advised students in DT-MRI filtering, interpolation, and registration.
- 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 Z formal language.

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## TEACHING EXPERIENCE

Spring 2013 CS6957: Probabilistic Modeling

Fall 2012 CS3130: Probability and Statistics for Engineers

Spring 2012 CS4640/BIOEN4640: Image Processing Basics

Fall 2011 CS3130: Probability and Statistics for Engineers

Spring 2011 CS7960: Advanced Image Processing

Fall 2010 CS3130: Probability and Statistics for Engineers

Spring 2010 CS4961: Image Processing Basics

Spring 2009 CS5960/6960: Nonparametric Methods

Fall 2008 CS2100: Discrete Structures

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.

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## STUDENT ADVISING

### **Former:**

Saurav Basu, M.S.

Masters Student, 2005-2006

Thesis: *Rician Noise Removal in Diffusion Tensor MRI*

Publications: [C39]

Ran Tao, M.S.  
Masters Student, 2006-2009  
DTI registration and analysis of white matter pathways.  
Publications: [C27, C37, J8, J17]

Abhishek Kumar  
Ph.D. Candidate, 2009-2010 (moved to U. of Maryland)  
Prediction of Alzheimer's disease progression from MRI and PET data.  
Publications: [C10]

Yen-Yun Yu  
(now working with Ross Whitaker and Suyash Awate at Utah)  
Ph.D. Candidate 2011-2012  
Working on shape analysis.

**Current:**

Nikhil Singh  
Ph.D. Candidate, 2008-present  
**Ph.D. defense date scheduled for October 21, 2013**  
Working on regression of brain image atlases.  
Publications: [C4, C5, C8, C14, C21]  
**Best paper award at ISBI 2013** (for [C5])

Wei Liu  
Ph.D. Candidate, 2008-present  
Working on resting-state fMRI analysis.  
Publications: [C12, C18, C20]

Xiang Hao  
Ph.D. Candidate, 2009-present  
Working on tractography and statistical analysis of DTI.  
Publications: [J2, C1, C17]

Prasanna Muralidharan  
Ph.D. Candidate 2011-present  
Working on statistical shape analysis.  
Publications: [C10, C11, C13]

Eleanor Wong  
Ph.D. Candidate 2011-present  
Working on object recognition in computer vision.  
Publications: [C6]

Miaomiao Zhang  
Ph.D. Candidate 2012-present  
Working on stochastic image registration.  
Publications: [C8, C7]

Xinghua “Stella” Zhu  
Visiting Ph.D. student from Hong Kong University 2012-present  
(Wenping Wang at HKU is her Ph.D. advisor)  
Working on high-angular resolution diffusion imaging  
Publications: [C9]

Michelle Hromatka  
Ph.D. Candidate 2013-present  
Working on fMRI analysis.

Kristen Zygmunt  
Ph.D. Candidate 2013-present  
Working on DTI analysis.  
Publications: [J2]

Paige Ashlynn  
Undergraduate Research Assistant 2012-present  
Working on shape analysis.

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#### STUDENT COMMITTEES

Neda Sadeghi, M.S., 2008  
Thesis: *Automatic Classification of Alzheimer’s Disease vs. Frontotemporal Dementia: A Decision Tree Approach with FDG-PET Cortical Metabolism*

Casey Goodlett, Ph.D., 2009  
Thesis: *Computation of Statistics for Populations of Diffusion Tensor Images*

Joshua Cates, Ph.D., 2009  
Thesis: *Shape Modeling and Analysis with Entropy-Based Particle Systems*

Tina Ziemek, Ph.D., 2010  
Thesis: *Evaluating the Effectiveness of Orientation Indicators With an Awareness of Individual Differences*

Linh Ha, Ph.D., 2011  
Thesis: *High Performance Multi-Scale Image Processing Framework on Multi-GPUs with Applications to Unbiased Diffeomorphic Atlas Construction*

Rama Krishna Sandeep Pokkunuri, M.S., 2011

Thesis: *Exploiting Example Structure in Multiple Instance Learning*

Suraj Musuvathy, Ph.D., 2011

Thesis: *Medial Axis of Regions Bounded by B-spline Curves and Surfaces*

Piyush Rai, Ph.D. 2012

Thesis: *Learning Latent Structures via Bayesian Nonparametrics: New Models and Efficient Inference*

Manasi Datar, Ph.D. candidate

James Fishbaugh, Ph.D. candidate

John Moeller, Ph.D. candidate

Parasaran Raman, Ph.D. candidate

Anuja Sharma, Ph.D. candidate

Gopal Veni, Ph.D. candidate

Bo Wang, Ph.D. candidate

Jacob Hinkle, Ph.D. candidate (Bioengineering)

Sourav Kole, Ph.D. candidate (Bioengineering)

Jared Nielsen, Ph.D. candidate (Neuroscience)

Neda Sadeghi, Ph.D. candidate (Bioengineering)

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## PUBLICATIONS

### Ph.D. Thesis

- [T1] P. T. Fletcher. “Statistical variability in nonlinear spaces: Application to shape analysis and DT-MRI.” PhD thesis. University of North Carolina, 2004.

### Books Chapters

- [B1] P. T. Fletcher. “Geodesic Regression and Its Application to Shape Analysis.” In: *Innovations for Shape Analysis*. Springer, 2013, pp. 35–52.
- [B2] 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*. Ed. by K. Siddiqi and S. Pizer. Springer, 2008. Chap. 8, pp. 241–266.

- [B3] S. Pizer, M. Styner, T. Terriberry, R. Broadhurst, S. Joshi, E. Chaney, and P. T. Fletcher. “Statistical applications with deformable m-reps.” In: ed. by K. Siddiqi and S. Pizer. Springer, 2008. Chap. 9, pp. 269–308.
- [B4] P. T. Fletcher, S. M. Pizer, and S. C. Joshi. “Shape Variation of Medial Axis Representations via Principal Geodesic Analysis on Symmetric Spaces.” In: *Statistics and Analysis of Shapes*. Ed. by H. Krim and A. Yezzi. Birkhauser, 2006. Chap. 2, pp. 29–60.

## Journal Articles

**Note: 15 articles since 2008 ([J1] - [J15])**

- [J1] V. A. Cardenas, D. Tosun, L. L. Chao, P. T. Fletcher, S. Joshi, M. W. Weiner, and N. Schuff. “Voxel-Wise Co-analysis of Macro-and Microstructural Brain Alteration in Mild Cognitive Impairment and Alzheimer’s Disease Using Anatomical and Diffusion MRI.” In: *Journal of Neuroimaging* (2013).
- [J2] X. Hao, K. Zygmunt, R. Whitaker, and P. T. Fletcher. “Improved Segmentation of White Matter Tracts with Adaptive Riemannian Metrics.” In: *Medical Image Analysis* accepted (2013).
- [J3] M. D. Prigge, E. D. Bigler, P. T. Fletcher, B. A. Zielinski, C. Ravichandran, J. Anderson, A. Froehlich, T. Abildskov, E. Papadopolous, K. Maasberg, J. A. Nielsen, A. L. Alexander, N. Lange, and J. Lainhart. “Longitudinal Heschl’s Gyrus Growth During Childhood and Adolescence in Typical Development and Autism.” In: *Autism Research* 6.2 (2013), pp. 78–90.
- [J4] P. T. Fletcher. “Geodesic Regression and the Theory of Least Squares on Riemannian Manifolds.” In: *International Journal of Computer Vision* (2012), pp. 1–15.
- [J5] N. Sadeghi, M. Prastawa, P. T. Fletcher, J. Wolff, J. H. Gilmore, and G. Gerig. “Regional characterization of longitudinal DT-MRI to study white matter maturation of the early developing brain.” In: *Neuroimage* 68 (2012), pp. 236–247.
- [J6] B. A. Zielinski, J. S. Anderson, A. L. Froehlich, M. B. Prigge, J. A. Nielsen, J. R. Cooperrider, A. N. Cariello, P. T. Fletcher, A. L. Alexander, N. Lange, E. D. Bigler, and J. E. Lainhart. “scMRI Reveals Large-Scale Brain Network Abnormalities in Autism.” In: *PloS one* 7.11 (2012), e49172.
- [J7] J. S. Anderson, J. A. Nielsen, A. L. Froehlich, M. B. DuBray, T. J. Druzgal, A. N. Cariello, J. R. Cooperrider, B. A. Zielinski, C. Ravichandran, P. T. Fletcher, A. L. Alexander, E. D. Bigler, N. Lange, and J. E. Lainhart. “Functional connectivity magnetic resonance imaging classification of autism.” In: *Brain* (2011).
- [J8] P. T. Fletcher, R. T. Whitaker, R. Tao, M. B. DuBray, A. Froehlich, C. Ravichandran, A. L. Alexander, E. D. Bigler, N. Lange, and J. E. Lainhart. “Microstructural connectivity of the arcuate fasciculus in adolescents with high-functioning autism.” In: *NeuroImage* 51.3 (2010), pp. 1117–1125.
- [J9] S. Gerber, T. Tasdizen, P. T. Fletcher, S. Joshi, and R. Whitaker. “Manifold modeling for brain population analysis.” In: *Medical Image Analysis* 14.5 (2010), pp. 643–653.

- [J10] N. Lange, M. DuBray, J. Lee, M. Froimowitz, A. Froehlich, N. Adluru, B. Wright, C. Ravichandran, P. T. Fletcher, E. Bigler, A. L. Alexander, and J. E. Lainhart. “Atypical diffusion tensor hemispheric asymmetry in autism.” In: *Autism Research* 3.6 (2010), pp. 350–358.
- [J11] P. T. Fletcher, S. Venkatasubramanian, and S. C. Joshi. “The geometric median on Riemannian manifolds with application to robust atlas estimation.” In: *NeuroImage* 45.1 (2009), S143–S152.
- [J12] C. B. Goodlett, P. T. Fletcher, J. H. Gilmore, and G. Gerig. “Group analysis of DTI fiber tract statistics with application to neurodevelopment.” In: *NeuroImage* 45.1, Supplement 1 (2009), S133–S142.
- [J13] E. Jurrus, M. Hardy, T. Tasdizen, P. T. Fletcher, P. Koshevoy, C.-B. Chien, W. Denk, and R. Whitaker. “Axon tracking in serial block-face scanning electron microscopy.” In: *Medical image analysis* 13.1 (2009), pp. 180–188.
- [J14] E. B. Dam, P. T. Fletcher, and S. M. Pizer. “Automatic shape model building based on principal geodesic analysis bootstrapping.” In: *Medical Image Analysis* 12.2 (2008), pp. 136–151.
- [J15] N. L. Foster, A. Y. Wang, T. Tasdizen, P. T. Fletcher, J. M. Hoffman, and R. A. Koeppe. “Realizing the potential of positron emission tomography with 18 F-fluorodeoxyglucose to improve the treatment of Alzheimer’s disease.” In: *Alzheimer’s and Dementia* 4.1 (2008), S29–S36.
- [J16] P. T. Fletcher and S. Joshi. “Riemannian geometry for the statistical analysis of diffusion tensors.” In: *Signal Processing* 87.2 (2007), pp. 250–262.
- [J17] W.-K. Jeong, P. T. Fletcher, R. Tao, and R. T. Whitaker. “Interactive visualization of volumetric white matter connectivity in diffusion tensor MRI using a parallel-hardware Hamilton-Jacobi solver.” In: *IEEE Transactions on Visualization and Computer Graphics* 13.6 (2007), pp. 1480–1487.
- [J18] I. Corouge, P. T. Fletcher, S. Joshi, S. Gouttard, and G. Gerig. “Fiber tract-oriented statistics for quantitative diffusion tensor MRI analysis.” In: *Medical Image Analysis* 10.5 (2006), pp. 786–798.
- [J19] S. M. Pizer, P. T. Fletcher, S. Joshi, A. G. Gash, J. Stough, A. Thall, G. Tracton, and E. L. Chaney. “A method and software for segmentation of anatomic object ensembles by deformable m-reps.” In: *Medical Physics* 32 (2005), pp. 1335–1345.
- [J20] P. T. Fletcher, C. Lu, S. M. Pizer, and S. Joshi. “Principal geodesic analysis for the study of nonlinear statistics of shape.” In: *IEEE Transactions on Medical Imaging* 23.8 (2004), pp. 995–1005.
- [J21] S. M. Pizer, P. T. Fletcher, S. Joshi, A. Thall, J. Z. Chen, Y. Fridman, D. S. Fritsch, A. G. Gash, J. M. Glotzer, M. R. Jiroutek, C. Lu, K. E. Muller, G. Tracton, P. Yushkevich, and E. L. Chaney. “Deformable m-reps for 3D medical image segmentation.” In: *International Journal of Computer Vision* 55.2–3 (2003), pp. 85–106.
- [J22] S. M. Pizer, P. T. Fletcher, A. Thall, M. Styner, G. Gerig, and S. Joshi. “Object Models in Multiscale Intrinsic Coordinates via M-reps.” In: *Image and Vision Computing* 21.1 (2003), pp. 5–15.

- [J23] P. Yushkevich, P. T. Fletcher, S. Joshi, A. Thall, and S. M. Pizer. “Continuous medial representations for geometric object modeling in 2D and 3D.” In: *Image and Vision Computing* 21.1 (2003), pp. 17–28.
- [J24] S. Joshi, S. Pizer, P. T. Fletcher, P. Yushkevich, A. Thall, and J. S. Marron. “Multiscale deformable model segmentation and statistical shape analysis using medial descriptions.” In: *Transactions on Medical Imaging* 21.5 (2002).

## Peer-Reviewed Conference and Workshop Papers

**Note: 33 papers since 2008 ([C1] - [C33])**

- [C1] X. Hao and P. T. Fletcher. “Joint Fractional Segmentation and Multi-Tensor Estimation in Diffusion MRI.” In: *Proceedings of the International Conference on Information Processing in Medical Imaging (IPMI)*. 2013.
- [C2] N. Sadeghi, M. W. Prastawa, P. T. Fletcher, J. H. Gilmore, and G. Gerig. “Multivariate Modeling of Longitudinal MRI in Early Brain Development with Confidence Measures.” In: *Proceedings of the IEEE International Symposium on Biomedical Imaging (ISBI)*. 2013.
- [C3] A. Sharma, P. T. Fletcher, J. H. Gilmore, M. L. Escolar, A. Gupta, M. Styner, and G. Gerig. “Spatiotemporal Modeling of Discrete-Time Distribution-Valued Data Applied to DTI Tract Evolution in Infant Neurodevelopment.” In: *Proceedings of the IEEE International Symposium on Biomedical Imaging (ISBI)*. 2013.
- [C4] N. P. Singh, J. Hinkle, S. Joshi, and P. T. Fletcher. “A Hierarchical Geodesic Model for Diffeomorphic Longitudinal Shape Analysis.” In: *Proceedings of the International Conference on Information Processing in Medical Imaging (IPMI)*. 2013.
- [C5] N. P. Singh, J. Hinkle, S. Joshi, and P. T. Fletcher. “A Vector Momenta Formulation of Diffeomorphisms for Improved Geodesic Regression and Atlas Construction.” In: *Proceedings of the IEEE International Symposium on Biomedical Imaging (ISBI)*. 2013.
- [C6] E. Wong, S. P. Awate, and P. T. Fletcher. “Adaptive Sparsity in Gaussian Graphical Models.” In: *International Conference on Machine Learning (ICML)*. 2013, to appear.
- [C7] M. Zhang and P. T. Fletcher. “Probabilistic Principal Geodesic Analysis.” In: *Neural Information Processing Systems*. 2013.
- [C8] M. Zhang, N. P. Singh, and P. T. Fletcher. “Bayesian Estimation of Regularization and Atlas Building in Diffeomorphic Image Registration.” In: *Proceedings of the International Conference on Information Processing in Medical Imaging (IPMI)*. 2013.
- [C9] X. Zhu, Y. Gur, W. Wang, and P. T. Fletcher. “Model Selection and Estimation of Multi-Compartment Models in Diffusion MRI with a Rician Noise Model.” In: *Proceedings of the International Conference on Information Processing in Medical Imaging (IPMI)*. 2013.
- [C10] M. Datar, P. Muralidharan, A. Kumar, S. Gouttard, J. Piven, G. Gerig, R. Whitaker, and P. T. Fletcher. “Mixed-Effects shape models for estimating longitudinal changes in anatomy.” In: *MICCAI Workshop on Spatio-temporal Image Analysis for Longitudinal and Time-Series Image Data*. Springer, 2012, pp. 76–87.



- [C11] J. Hinkle, P. Muralidharan, P. T. Fletcher, and S. Joshi. “Polynomial regression on Riemannian manifolds.” In: *Computer Vision–ECCV 2012*. Springer, 2012, pp. 1–14.
- [C12] W. Liu, S. P. Awate, and P. T. Fletcher. “Group Analysis of Resting-State fMRI by Hierarchical Markov Random Fields.” In: *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*. Springer, 2012, pp. 189–196.
- [C13] P. Muralidharan and P. T. Fletcher. “Sasaki metrics for analysis of longitudinal data on manifolds.” In: *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. 2012, pp. 1027–1034.
- [C14] N. Singh, A. Y. Wang, P. Sankaranarayanan, P. T. Fletcher, and S. Joshi. “Genetic, structural and functional imaging biomarkers for early detection of conversion from MCI to AD.” In: *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*. Springer, 2012, pp. 132–140.
- [C15] P. T. Fletcher. “Geodesic Regression on Riemannian Manifolds.” In: *MICCAI Workshop on Mathematical Foundations of Computational Anatomy (MFCA)*. 2011.
- [C16] P. T. Fletcher, J. Moeller, J. Phillips, and S. Venkatasubramanian. “Horoball hulls and extents in positive definite space.” In: *Algorithms and Data Structures*. Springer, 2011, pp. 386–398.
- [C17] X. Hao, R. Whitaker, and P. T. Fletcher. “Adaptive Riemannian metrics for improved geodesic tracking of white matter.” In: *Information Processing in Medical Imaging*. Springer, 2011, pp. 13–24.
- [C18] W. Liu, S. Awate, J. Anderson, D. Yurgelun-Todd, and P. T. Fletcher. “Monte Carlo expectation maximization with hidden Markov models to detect functional networks in resting-state fMRI.” In: *MICCAI Workshop on Machine Learning in Medical Imaging*. Springer, 2011, pp. 59–66.
- [C19] N. Sadeghi, M. Prastawa, P. T. Fletcher, J. Gilmore, W. Lin, and G. Gerig. “Statistical Growth Modeling of Longitudinal DT-MRI for Regional Characterization of Early Brain Development.” In: *MICCAI Workshop on Image Analysis of Human Brain Development*. 2011.
- [C20] W. Liu, P. Zhu, J. Anderson, D. Yurgelun-Todd, and P. T. Fletcher. “Spatial regularization of functional connectivity using high-dimensional Markov random fields.” In: *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*. Springer, 2010, pp. 363–370.
- [C21] N. Singh, P. T. Fletcher, J. S. Preston, L. Ha, R. King, J. S. Marron, M. Wiener, and S. Joshi. “Multivariate Statistical Analysis of Deformation Momenta Relating Anatomical Shape to Neuropsychological Measures.” In: *Medical Image Computing and Computer Assisted Intervention*. 2010, pp. 529–537.
- [C22] M. Datar, J. Cates, P. T. Fletcher, S. Gouttard, G. Gerig, and R. T. Whitaker. “Particle-Based Shape Regression of Open Surfaces with Applications to Developmental Neuroimaging.” In: *Medical Image Computing and Computer Assisted Intervention*. 2009, pp. 167–174.
- [C23] P. T. Fletcher, J. Moeller, J. Phillips, and S. Venkatasubramanian. “Computing hulls in positive definite space.” In: *19th Fall Workshop on Computational Geometry*. 2009.

- [C24] L Ha, J Kruger, P. T. Fletcher, S. Joshi, and C. T. Silva. “Fast parallel unbiased diffeomorphic atlas construction on multi-graphics processing units.” In: *Proceedings of the Eurographics Symposium on Parallel Graphics and Visualization*. 2009.
- [C25] J. Hinkle, P. T. Fletcher, B. Wang, B. Salter, and S. Joshi. “4D map image reconstruction incorporating organ motion.” In: *Information Processing in Medical Imaging*. Springer, 2009, pp. 676–687.
- [C26] I. Oguz, J. Cates, R. T. Whitaker, P. T. Fletcher, M. Niethammer, and M. Styner. “Cortical correspondence with probabilistic fiber connectivity.” In: *Information Processing in Medical Imaging*. 2009, pp. 651–663.
- [C27] R. Tao, P. T. Fletcher, S. Gerber, and R. Whitaker. “A Variational Image-Based Approach to the Correction of Susceptibility Artifacts in the Alignment of Diffusion Weighted and Structural MRI.” In: *Information Processing in Medical Imaging*. Springer, 2009, pp. 664–675.
- [C28] J. Cates, P. T. Fletcher, Z. Warnock, and R. Whitaker. “A shape analysis framework for small animal phenotyping with application to mice with a targeted disruption of Hox-D11.” In: *IEEE International Symposium on Biomedical Imaging*. 2008, pp. 512–516.
- [C29] J. Cates, P. T. Fletcher, and R. Whitaker. “A Hypothesis Testing Framework for High-Dimensional Shape Models.” In: *MICCAI Workshop on Mathematical Foundations of Computational Anatomy*. 2008, pp. 170–181.
- [C30] J. Cates, P. T. Fletcher, M. Styner, H. Hazlett, and R. Whitaker. “Particle-based shape analysis of multi-object complexes.” In: *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*. Springer, 2008, pp. 477–485.
- [C31] P. T. Fletcher, S. Venkatasubramanian, and S. C. Joshi. “Robust statistics on Riemannian manifolds via the geometric median.” In: *IEEE Conference on Computer Vision and Pattern Recognition*. 2008.
- [C32] C. B. Goodlett, P. T. Fletcher, J. H. Gilmore, and G. Gerig. “Group Statistics of DTI Fiber Bundles Using Spatial Functions of Tensor Measures.” In: *Medical Image Computing and Computer-Assisted Intervention*. 2008, pp. 1068–1075.
- [C33] I. Oguz, J. Cates, P. T. Fletcher, R. T. Whitaker, D. Cool, S. Aylward, and M. Styner. “Entropy-based particle systems and local features for cortical correspondences.” In: *IEEE International Symposium on Biomedical Imaging (ISBI)*. 2008.
- [C34] J. Cates, P. T. Fletcher, M. Styner, M. Shenton, and R. T. Whitaker. “Shape Modeling and Analysis with Entropy-Based Particle Systems.” In: *Information Processing in Medical Imaging*. 2007, pp. 333–345.
- [C35] B. Davis, P. T. Fletcher, E. Bullitt, and S. Joshi. “Population shape regression from random design data.” In: *Proceedings of IEEE International Conference on Computer Vision*. 2007.
- [C36] P. T. Fletcher, S. Powell, N. L. Foster, and S. C. Joshi. “Quantifying metabolic asymmetry modulo structure in Alzheimer’s disease.” In: *Proceedings of Information Processing in Medical Imaging (IPMI)*. 2007, pp. 446–457.

- [C37] P. T. Fletcher, R. Tao, W.-K. Jeong, and R. T. Whitaker. “A volumetric approach to quantifying region-to-region white matter connectivity in diffusion tensor MRI.” In: *Proceedings of Information Processing in Medical Imaging (IPMI)*. 2007, pp. 346–358.
- [C38] C. Goodlett, P. T. Fletcher, W. Lin, and G. Gerig. “Quantification of measurement error in DTI: Theoretical predictions and validation.” In: *Medical Image Computing and Computer Assisted Intervention*. 2007, pp. 10–17.
- [C39] S. Basu, P. T. Fletcher, and R. Whitaker. “Rician noise removal in diffusion tensor MRI.” In: *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*. Springer, 2006, pp. 117–125.
- [C40] J. Cates, M. Meyer, P. T. Fletcher, and R. T. Whitaker. “Entropy-Based Particle Systems for Shape Correspondence.” In: *MICCAI Workshop on Mathematical Foundations of Computational Anatomy*. 2006.
- [C41] P. T. Fletcher and R. T. Whitaker. “Riemannian Metrics on the Space of Solid Shapes.” In: *MICCAI Workshop on Mathematical Foundations of Computational Anatomy (MFCA)*. 2006.
- [C42] G. Gerig, S. Joshi, P. T. Fletcher, K. Gorcowski, S. Xu, S. M. Pizer, and M. Styner. “Statistics of populations of images and its embedded objects: Driving applications in neuroimaging.” In: *3rd IEEE International Symposium on Biomedical Imaging (ISBI)*. 2006, pp. 1120–1123.
- [C43] M. Styner, K. Gorcowski, P. T. Fletcher, J. Jeong, S. Pizer, and G. Gerig. “Statistics of pose and shape in multi-object complexes using principal geodesic analysis.” In: *Medical Imaging and Augmented Reality*. Springer, 2006, pp. 1–8.
- [C44] I. Corouge, P. T. Fletcher, S. Joshi, J. Gilmore, and G. Gerig. “Fiber tract-oriented statistics for quantitative diffusion tensor MRI analysis.” In: *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*. Springer, 2005, pp. 131–139.
- [C45] E. Dam, P. T. Fletcher, S. M. Pizer, G. Tracton, and J. Rosenman. “Prostate Shape Modeling Based on Principal Geodesic Analysis Bootstrapping.” In: *Medical Image Computing and Computer Assisted Intervention*. 2004, pp. 1008–1016.
- [C46] P. T. Fletcher and S. Joshi. “Principal geodesic analysis on symmetric spaces: statistics of diffusion tensors.” In: *Proceedings of Workshop on Computer Vision Approaches to Medical Image Analysis (CVAMIA)*. 2004.
- [C47] P. T. Fletcher, S. Joshi, C. Lu, and S. M. Pizer. “Gaussian Distributions on Lie Groups and Their Application to Statistical Shape Analysis.” In: *Information Processing in Medical Imaging*. Vol. LNCS 2732. Springer-Verlag, 2003, pp. 450–462.
- [C48] P. T. Fletcher, C. Lu, and S. Joshi. “Statistics of Shape via Principal Geodesic Analysis on Lie Groups.” In: *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. 2003, pp. 95–101.
- [C49] P. T. Fletcher, S. M. Pizer, A. G. Gash, and S. Joshi. “Deformable m-rep segmentation of object complexes.” In: *IEEE International Symposium on Biomedical Imaging (ISBI)*. 2002.

- [C50] S. Joshi, S. Pizer, P. T. Fletcher, A. Thall, and G. Tracton. “Multi-scale 3-D deformable model segmentation based on medial description.” In: *Information Processing in Medical Imaging*. Springer, 2001, pp. 64–77.
- [C51] S. Pizer, S. Joshi, P. T. Fletcher, M. Styner, G. Tracton, and J. Chen. “Segmentation of single-figure objects by deformable M-reps.” In: *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*. Springer, 2001, pp. 862–871.
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#### INVITED TALKS

1. BIRS Workshop on Geometry for Anatomy, Banff, Alberta, Invited Talk on “Geodesic Regression on Shape Manifolds”, August, 2011.
2. Dagstuhl Workshop on Innovations for Shape Analysis, Dagstuhl, Germany, Invited Talk on “Geodesic Regression on Shape Manifolds”, April, 2011.
3. Summer School on Manifold Learning in Image and Signal Analysis, Ven, Sweden, Invited lecture on “Statistics on Manifolds”, August, 2009.
4. Massachusetts Institute of Technology, Computer Science and Artificial Intelligence Laboratory, Invited Talk on “Robust Statistics on Riemannian Manifolds”, July, 2009.
5. MICCAI Workshop on Computational Diffusion MRI, New York, NY, Invited talk on “Volumetric Segmentation and Tract-Based Statistics of White Matter Pathways”, August 2008.
6. All-Hands Meeting, NIH Roadmap National Centers for Biomedical Computing (NCBC), “Statistics of Anatomy for Multimodal Image Analysis”, August 2008.
7. Hausdorff Center for Mathematics, Bonn, Germany, Invited talk at the Workshop on Geometry and Statistics of Shapes, “Robust Statistics on Riemannian Manifolds via the Geometric Median”, June 2008.
8. Bioimaging Research Center, University of Georgia, “Statistics of Anatomy for Multimodal Image Analysis”, March 2008.
9. Department of Radiology, University of Pennsylvania, “Statistics of Anatomy for Multimodal Image Analysis”, March 2008.
10. Statistical and Applied Mathematical Sciences Institute (SAMSI) Workshop on Geometry and Statistics of Shape Spaces, Research Triangle Park, North Carolina, Invited talk on “Regression Analysis on Manifolds”, July, 2007.
11. Institute for Mathematics and its Applications (IMA) Workshop on Shape Spaces, University of Minnesota, Invited poster on “Riemannian Metrics on the Space of Solid Shapes”, April 2007.

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## INTERNAL SERVICE

Organized the first SoC Fall Graduate Recruiting Open House (2012)

Organizer of 2011 SoC Prospective Grad Visit.

Member of Data Management and Analysis Track Committee, 2011 - present

Director of SoC BS/MS program, 2010 - present.

Creator and Chair of Image Analysis Graduate Track, 2010 - present.

Member of Graduate Studies Committee, 2010 - present.

SoC Curriculum Committee, Fall 2008 - present.

Activities: 1) helped develop new undergraduate mathematics requirements, 2) currently developing a “Visual Computing” undergraduate track.

SoC Graduate Admissions Committee, Fall 2009 - present.

Helped organize 2008 Grad Orientation Visit research talks.

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## PROFESSIONAL SERVICE

### **Organization**

(upcoming) Organizing MICCAI 2013 Workshop on Mathematical Foundations of Computational Anatomy (MFCA 2013)

(upcoming) Organizing MICCAI 2013 Tutorial on “The R programming language: a statistical foundation for reproducible studies in medical image analysis”

Organized MICCAI 2012 Workshop on “Spatio-Temporal Image Analysis for Longitudinal and Time-Series Image Data” (STIA 2012)

Organized MICCAI 2010 Workshop on “Spatio-Temporal Image Analysis for Longitudinal and Time-Series Image Data” (STIA 2010)

Organized a Tutorial on “Statistical Shape Analysis: Theory, Software, and Applications” as part of the 2009 IEEE International Symposium on Biomedical Imaging.

### **Review Committees**

MICCAI 2006, 2007, 2008, 2009

IPMI 2011, 2013

EuroGraphics 2009

IEEE Vis 2009  
CVPR 2010, 2011  
ECCV 2010

### **Program Committees**

Medical Image Computing and Computer Assisted Intervention (MICCAI) 2013.  
Medical Image Computing and Computer Assisted Intervention (MICCAI) 2012.  
Medical Image Computing and Computer Assisted Intervention (MICCAI) 2011.  
MICCAI Workshop on Probabilistic Models for Medical Image Analysis (PMMIA) 2009.  
MICCAI Workshop on Computational Diffusion MRI (CDMRI) 2008.  
MICCAI Workshop on Mathematical Foundations of Computational Anatomy 2011.  
MICCAI Workshop on Mathematical Foundations of Computational Anatomy 2008.  
MICCAI Workshop on Mathematical Foundations of Computational Anatomy 2006.

### **Journal Reviews**

IEEE Transactions on Pattern Analysis and Machine Intelligence  
IEEE Transactions on Medical Imaging  
Medical Image Analysis  
International Journal on Computer Vision  
SIAM SIIMS  
Journal of Mathematical Imaging and Vision  
NeuroImage  
Human Brain Mapping

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### HONORS AND AWARDS

2013 Best paper, International Symposium on Biomedical Imaging, 2013. [C5]  
2010 Best paper of MICCAI/MedIA Special Issue, 2010. [J9]  
2010 Most cited paper in journal *Signal Processing* between 2007-2009. [J16]  
2007 Winner of David Marr Best Paper Prize, ICCV 2007. [C35]  
2003 Runner-up for Francois Erbsmann Best Paper Prize, IPMI 2003. [C47]  
2003 Best Paper, 18th Annual Radiology Research Symposium, University of North Carolina at Chapel Hill (Fletcher, et al.).  
1995–1999 Echols Scholar, University of Virginia.

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## FUNDING

### Current Funding

*BIGDATA: Small: DA: Collaborative Research: From Data to Users: Providing Interpretable and Verifiable Explanations in Data Mining*

NSF Small

PI: Suresh Venkatasubramanian

Role: Co-PI

\$500,000 over 3 years, 2013-2016 (50% Co-PI).

*4D Shape Analysis for Modeling Spatiotemporal Change Trajectories in Huntington's Disease*

NIH Contract

PI: Dr. Guido Gerig

Role: Co-PI

\$430,346 over 3 years, 2012-2015 (50% Co-PI).

*Manifold Learning for Accurate Search and Locate Tasks in Image Datasets*

Contract with Pacific Northwest National Lab

Role: Principal Investigator

\$100,000 over 2 years, 2012-2014.

*CAREER: Statistical Models and Classification of Time-Varying Shape*

NSF CAREER Award

Role: Principal Investigator

\$404,962 over 5 years, 2011-2016.

*REU Supplement for CAREER Award*

NSF Research Experiences for Undergraduates (REU)

Role: Principal Investigator

\$8,000 over 1 year, 2012-2013.

*The Microstructural Basis of Abnormal Connectivity in Autism*

NIH R01

PI: Dr. Janet Lainhart, Department of Psychiatry, University of Utah

Role: Co-Investigator

\$1,881,250 for 5 years, 2009-2014 (30% Co-PI).

### Past Funding

*Online Tools for Customizable ADNI Atlases: Technology and Applications*

NIH R01

PI: Dr. Sarang Joshi, Department of Biomedical Engineering, University of Utah

Role: Co-Investigator

\$1,320,413 for 4 years, 2008-2012 (25% Co-PI).

*ITK Algorithms for Analyzing Time-Varying Shape with Application to Longitudinal*

*Heart Modeling*

NIH/NLM Contract

Role: Principal Investigator

\$148,157 for 1 year, 2010-2011.

*Longitudinal Microstructural Development of the Arcuate Fasciculus in Autism and Typical Development*

University of Utah VP Funding Incentive Seed Grant,

Role: Principal Investigator

\$22,400 for 1 year, 2009-10.

*National Alliance for Medical Imaging Computing (NAMIC)*

NIH 1U54EB005149-01, 09/2004 - 07/2009

PI: Ross Whitaker, Department of Computer Science, University of Utah

Role: Co-Investigator

*Quantifying white matter connectivity in autism*

University of Utah Interdisciplinary Seed Grant

Role: Principal Investigator

\$5,000 for 1 year, 2008.

*Quantifying white matter connectivity in autism*

Autism Speaks Mentor Based Fellowship

Mentor: Dr. Janet Lainhart, Department of Psychiatry, University of Utah

\$122,000 over 2 years, Feb 2008-2010.