

Miaomiao Zhang

CONTACT INFORMATION	Computer Science and Artificial Intelligence Lab Massachusetts Institute of Technology 32 Vassar Street, 32-D475A Cambridge, MA 02139 USA	<i>Cell:</i> (801) 232-3679 <i>E-mail:</i> miao86@mit.edu
RESEARCH INTERESTS	Image Analysis, Machine Learning, Statistical Modeling, and Computer Vision	
EDUCATION	University of Utah , Salt Lake City, UT Ph.D. in Computing, School of Computing	08/2010 - 10/2015
	East China Normal University , Shanghai, China M.S. in Computer Science	09/2008 - 07/2010
	Henan Normal University , Henan, China B.S. in Computer Science	09/2004 - 07/2008
SELECTED HONORS	<ul style="list-style-type: none">• Young Scientist Award (a.k.a. Best Paper Award), Medical Image Computing and Computer Assisted Intervention (MICCAI) 2014• Runners Up for Young Scientist Award, MICCAI 2016• Student Travel Award, MICCAI 2014, 2016• Travel Grant Support, 23rd Information Processing in Medical Imaging (IPMI) 2013• Travel Grant Award, Women in Machine Learning (WIML) 2013• Travel Grant Award, CRA-W Grad Cohort Workshop 2012• Student Teaching Award, Henan, China 2008• National Scholarship (1 out of 164), China 2006, 2007	
RESEARCH EXPERIENCE	Massachusetts Institute of Technology, Cambridge, MA <i>Postdoctoral Associate</i> , Advisor: Dr. Polina Golland Currently focus on deriving theoretical problems of low-dimensional statistical shape analysis for imaging data; conducting research in sparse image registration for undersampled pathology images.	11/2015 -
	University of Utah, Salt Lake City, UT <i>Graduate Research Assistant</i> , Advisor: Dr. P. Thomas Fletcher	05/2012 - 10/2015
	<ul style="list-style-type: none">• Developed an entire Bayesian framework for statistical shape analysis of high-dimensional nonlinear data and its applications to Brain Magnetic Resonance Imaging and Alzheimer's disease	

- Proposed efficient Bayesian inference algorithms of sampling on manifolds
- Defined a novel finite-dimensional representation of diffeomorphisms in a discrete space, which has never been done in the literature
- Mentored students in Bayesian multiatlas building, clustering models, and diffeomorphic registration.

East China Normal University, Shanghai, China 09/2008 - 07/2010
Graduate Research Assistant, Advisor: Dr. Guixu Zhang

- Presented a new model for a single color image dehazing and denoising
- Improved the speed and accuracy of traditional image segmentation methods by using fuzzy clustering analysis
- Numerically derived the variational formulation of level set methods and designed a new optimization strategy for searching a better optima.

INVITED TALKS
PRESENTATIONS

- Low-Dimensional Statistics of Anatomical Variability Via Compact Representation of Image Deformations, MICCAI, October 2016, Greece
- Bayesian Models on Manifolds for Image Registration and Statistical Shape Analysis, East China Normal University / Shanghai University / Henan Normal University, May 2016, China
- Finite-Dimensional Lie Algebras for Fast Diffeomorphic Image Registration, IPMI, June 2015, Isle of Skye, UK
- Fast Diffeomorphic Image Registration, East China Normal University, May 2015, Shanghai, China
- Bayesian Analysis of Diffeomorphic Shape Variability, MIT, April 2015, Cambridge, USA
- Probabilistic Principal Geodesic Analysis, East China Normal University, January 2014, Shanghai, China
- Bayesian Estimation of Regularization and Atlas Building in Diffeomorphic Image Registration, IPMI, June 2013, California, USA

PROFESSIONAL **Journal Reviews**
ACTIVITIES

- IEEE Transactions on Imaging Processing 2017
- IEEE Transactions on Pattern Analysis and Machine Intelligence 2016
- NeuroImage 2016
- Frontiers in Neuroscience 2016
- IEEE Transactions on Medical Imaging 2016

- Medical Image Analysis 2015, 2016
- Computer Vision and Image Understanding 2015
- Journal of Zhejiang University Science 2014

Conference Reviews

- IPMI 2017
- NIPS 2016
- MICCAI 2015

Book Chapter Reviews

- Algorithmic Advances in Riemannian Geometry and Applications, Springer 2016

PUBLICATIONS

- [1] FLETCHER, P. T., AND **Zhang, M.** Probabilistic geodesic models for regression and dimensionality reduction on riemannian manifolds. In *Riemannian Computing in Computer Vision*. Springer, 2015.
- [2] GAO, Y., **Zhang, M.**, FLETCHER, P. T., AND GERIG, G. Image registration and segmentation in longitudinal MRI using temporal appearance modeling. In *International Symposium on Biomedical Imaging - ISBI 2016 (accepted)*. Springer, 2016.
- [3] HROMATKA, M., **Zhang, M.**, FLEISHMAN, G. M., GUTMAN, B., JAHANSHAD, N., THOMPSON, P., AND FLETCHER, P. T. A hierarchical bayesian model for multi-site diffeomorphic image atlases. In *Medical Image Computing and Computer-Assisted Intervention–MICCAI 2015*. Springer, 2015.
- [4] LIAO, R., TURK, E. A., **Zhang, M.**, LUO, J., GRANT, P. E., ADALSTEINSSON, E., AND GOLLAND, P. Temporal registration in in-utero volumetric mri time series. In *International Conference on Medical Image Computing and Computer-Assisted Intervention (2016)*, Springer, pp. 54–62.
- [5] LIU, T., **Zhang, M.**, JAVANMARDI, M., RAMESH, N., AND TASHIZEN, T. Sshmt: Semi-supervised hierarchical merge tree for electron microscopy image segmentation. In *European Conference on Computer Vision (2016)*, Springer, pp. 144–159.
- [6] **Zhang, M.**, AND FLETCHER, P. T. Probabilistic principal geodesic analysis. In *Advances in Neural Information Processing Systems (2013)*.
- [7] **Zhang, M.**, AND FLETCHER, P. T. Bayesian principal geodesic analysis in diffeomorphic image registration. In *Medical Image Computing and Computer-Assisted Intervention–MICCAI 2014*. Springer, 2014.
- [8] **Zhang, M.**, AND FLETCHER, P. T. Bayesian principal geodesic analysis for estimating intrinsic diffeomorphic image variability. *Medical Image Analysis (2015)*.

- [9] **Zhang, M.**, AND FLETCHER, P. T. Bayesian statistical shape analysis on the manifold of diffeomorphisms. In *Riemannian Volume*. Springer, In progress, 2015.
- [10] **Zhang, M.**, AND FLETCHER, P. T. Bayesian statistical shape analysis on the manifold of diffeomorphisms. In *Riemannian Volume (under review)*. Springer, 2015.
- [11] **Zhang, M.**, AND FLETCHER, P. T. Fast geodesic shooting via low-dimensional Lie algebras. *International Journal of Computer Vision (under review)* (2015).
- [12] **Zhang, M.**, AND FLETCHER, P. T. Finite-dimensional Lie algebras for fast diffeomorphic image registration. In *Information Processing in Medical Imaging* (2015).
- [13] **Zhang, M.**, AND GOLLAND, P. Statistical shape analysis: From landmarks to diffeomorphisms. *Medical Image Analysis 33* (2016), 155–158.
- [14] **Zhang, M.**, SHAO, H., AND FLETCHER, P. T. A mixture model for automatic diffeomorphic multi-atlas building. In *MICCAI Workshop - BAMBI* (2015).
- [15] **Zhang, M.**, SINGH, N., AND FLETCHER, P. T. Bayesian estimation of regularization and atlas building in diffeomorphic image registration. In *Information Processing in Medical Imaging* (2013), Springer.
- [16] **Zhang, M.**, WELLS III, W. M., AND GOLLAND, P. Low-dimensional statistics of anatomical variability via compact representation of image deformations. In *International Conference on Medical Image Computing and Computer-Assisted Intervention* (2016), Springer, pp. 166–173.

TEACHING
EXPERIENCE

- Teaching Assistant, Image Processing, University of Utah Fall 2010
- International Teaching Assistant Workshop, University of Utah 08/2010
- Teaching Assistant, Linear Algebra, ECNU Fall 2009
- Lecturer, Introduction to Computer Programming, HNU Spring 2008

SOFTWARE
RELEASES

FLASH This is a free C++ library of a fast diffeomorphic image registration algorithm.

Distributed via: <https://bitbucket.org/FlashC/flashc>

Role: Developer

Manifold Statistics This is a free C++ library for general computations and statistics on Riemannian manifolds.

Distributed via: <https://bitbucket.org/vakra/manifoldstatistics>

Role: Team member, my main contribution is the probabilistic principal geodesic analysis package