

# Sebastian A. Kurtek

The Ohio State University  
Department of Statistics  
Cockins Hall 440H  
Columbus, OH 43210

Telephone Number: (614) 292-0643  
Email: [kurtek.1@stat.osu.edu](mailto:kurtek.1@stat.osu.edu)  
Personal Webpage: <http://stat.osu.edu/~kurtek.1>

## Education

Ph.D. Biostatistics, Florida State University, August 2012

Advisor: Prof. Anuj Srivastava

Dissertation: *Riemannian Shape Analysis of Curves and Surfaces*

M.S. Biostatistics, Florida State University, May 2009

B.S. Mathematics, Tulane University, May 2007

*Minor*: Economics

*Honors*: *Cum Laude*

Senior Seminar Presentation: *Application of Markov Chain Monte Carlo to Community Ecology*, G. Cobb and Y. Chen (2003)

## Research Interests

Statistical Image Analysis, Statistical Shape Analysis, Functional Data Analysis, Statistics on Manifolds, Medical Imaging, Bioinformatics, Computational Statistics

## Academic Experience

### *The Ohio State University*

Associate Professor, Department of Statistics, Summer 2018–Present

Assistant Professor, Department of Statistics, Fall 2012–Summer 2018

Associate Director, Mathematical Biosciences Institute, Summer 2018–Present

Affiliated Faculty, Translational Data Analytics Institute @ Ohio State, Fall 2015–Present

Biostatistics Faculty, Interdisciplinary Ph.D. Program in Biostatistics, Fall 2012–Present

### *Florida State University*

Graduate Research Assistant, Department of Statistics, Fall 2008–Summer 2012

Graduate Instructor, Department of Statistics, Summer 2008–Spring 2009

Graduate Teaching Assistant, Department of Statistics, Fall 2007–Spring 2008

### *Lille 1 University*

Visiting Researcher, Multimedia, Image, Indexing and Recognition (MIIRE) Research Group, Computer Science Research Laboratory, Lille, France, December 2–December 10, 2011

### *National Institute for Research in Computer Science and Control (INRIA)*

Visiting Researcher, ARIANA Group, Sophia-Antipolis, France, June 1–June 15, 2009

## Awards

14. IEEE Senior Member, March, 2018.
13. Institute of Mathematical Statistics (IMS) Travel Award, April, 2016.
12. Society for Industrial and Applied Mathematics (SIAM) Conference Travel Award (\$2000), International Congress on Industrial and Applied Mathematics (ICIAM), Beijing, China, August, 2015.
11. Simons Travel Grant (\$4000), American Mathematical Society (AMS), May, 2014.
10. Best Paper Award, International Conference on Pattern Recognition Applications and Methods (ICPRAM), Angers, France, March, 2014. **Selected from 100 accepted papers.**
9. Best Paper Award, Digital Image Computing Techniques and Applications (DICTA), Fremantle, Australia, December, 2012.
8. R.A. Bradley Dissertation Award, Department of Statistics, Florida State University, September, 2012.
7. Graduate Student Research and Creativity Award, Graduate School, Florida State University, April, 2012. **Two awardees selected from STEM areas per year.**
6. Best Paper Award, IEEE International Workshop on Mathematical Methods in Biomedical Image Analysis (MMBIA), Breckenridge, CO, January, 2012. **Selected from 39 accepted papers.**
5. Conference Travel Award, Neural Information Processing Systems (NIPS), Granada, Spain, December, 2011.
4. Runner-Up to the Francois Erbsmann Prize (best paper and presentation by a young researcher), Information Processing in Medical Imaging (IPMI), Irsee, Germany, July, 2011. **Selected from 63 accepted papers.**
3. Conference Travel Award, Information Processing in Medical Imaging (IPMI), Irsee, Germany, July, 2011.
2. Yongyuan and Anna Li Award (best graduate student presentation), Department of Statistics, Florida State University, May, 2011.
1. Student Presentation Award Second Prize, Florida Chapter of the American Statistical Association (ASA), Orlando, FL, February, 2009.

## Student Awards

10. Best Poster Award, Ph.D. student Abhijoy Saha, 2018 IISA International Conference on Statistics, Gainesville, FL, May, 2018.
9. Whitney Award for Best Research Assistant, Ph.D. student Abhijoy Saha, Department of Statistics, The Ohio State University, May, 2018.
8. Presidential Fellowship, Ph.D. student Abhijoy Saha, The Ohio State University, April, 2018.
7. Craig Cooley Memorial Prize, Ph.D. student Justin Strait, Department of Statistics, The Ohio State University, April, 2018.
6. Travel Award, Ph.D. students Justin Strait and Abhijoy Saha, Conference on Bayesian Nonparametrics, Paris, France, June, 2017.
5. Presidential Fellowship, Ph.D. student Justin Strait, The Ohio State University, April, 2017.
4. Hayes Graduate Research Forum Third Place, Ph.D. student Justin Strait, The Ohio State University, March, 2017.
3. Student Paper Travel Award, Ph.D. student Abhijoy Saha, Section on Bayesian Statistical Science (SBSS) of the American Statistical Association (ASA), January, 2017.
2. Student Paper Travel Award, Ph.D. student Yi Lu, International Chinese Statistical Association (ICSA) Applied Statistics Symposium, Atlanta, GA, June, 2016.
1. SPAAC Statistical Significance Poster Competition Honorable Mention, Ph.D. student Weiyi Xie, Joint Statistical Meetings (JSM), Seattle, WA, August, 2015.

## Grants

7. *TRIPODS+X: EDU: An MBI TGDA+Neuro Program for Undergraduates*, National Science Foundation (NSF), CCF 1839356, Co-PI (with PI Janet Best and co-PIs Yune Lee, Yusu Wang and Facundo Memoli), 2018-2021.
6. *TRIPODS+X: RES: Improving Templated Microstructures via Topological Data Analysis*, National Science Foundation (NSF), CCF 1839252, Co-PI (with PI Tamal Dey), 2018-2021.
5. *Synthesizing Image-derived Heterogeneity with Genomic Measurements for Assessing Disease Aggressiveness in Lower Grade Gliomas*, National Institutes of Health (NIH), R37 CA214955, PI (with PI Arvind Rao and co-PIs Karthik Bharath and Veera Baladandayuthapani), 2017-2022.
4. *CBMS Conference: Elastic Functional and Shape Data Analysis (EFSDA)*, National Science Foundation (NSF), DMS 1743943, PI (with co-PIs Facundo Memoli, Yusu Wang, Tingting Zhang and Hongtu Zhu), 2017-2018.
3. *TRIPODS: Topology, Geometry, and Data Analysis (TGDA@OSU): Discovering Structure, Shape, and Dynamics in Data*, National Science Foundation (NSF), CCF 1740761, Co-PI (with PI Tamal Dey and co-PIs David Sivakoff, Yusu Wang and Facundo Memoli), 2017-2020.
2. *A Geometric Approach to Bayesian Modeling and Inference with the Nonparametric Fisher-Rao Metric*, National Science Foundation (NSF), DMS 1613054, PI (with co-PI Karthik Bharath), 2016-2019.
1. *Statistical Shape Analysis of Annotated Elastic Surfaces*, National Security Agency (NSA), Young Investigator Award, Declined.

## Publications

### *Books and Monographs*

1. I.H. Jermyn, S. Kurtek, H. Laga, A. Srivastava, “Elastic Shape Analysis of Three-Dimensional Objects,” *Synthesis Lectures on Computer Vision*, Ed. G. Medioni and S. Dickinson, Morgan & Claypool Publishers, 2017.

### *Journal Publications*

26. J. Strait, O. Chkrebti, S. Kurtek, “Bayesian Models for Automatic Landmark Detection on Elastic Curves,” *Journal of the American Statistical Association*, Accepted for Publication, 2018.
25. A. Saha, S. Kurtek, “Geometric Sensitivity Measures for Bayesian Nonparametric Density Estimation Models,” *Sankhya A*, Accepted for Publication, 2018.
24. K. Bharath\*, S. Kurtek\*, A.U.K. Rao, V. Baladandayuthapani (\*indicates equal contribution), “Radiologic Image-based Statistical Shape Analysis of Brain Tumours,” *Journal of the Royal Statistical Society, Series C*, vol. 67, no. 5, pp. 1357-1378, 2018.
23. Y. Lu, R. Herbei, S. Kurtek, “Bayesian Registration of Functions with a Gaussian Process Prior,” *Journal of Computational and Graphical Statistics*, vol. 26, no. 4, pp. 894-904, 2017.
22. R. Meng, S. Saade, S. Kurtek, B. Berger, C. Brien, K. Pillen, M. Tester, Y. Sun, “Growth Curve Registration for Evaluating Salinity Tolerance in Barley,” *Plant Methods*, vol. 13, no. 1, 2017.
21. S. Kurtek, “A Geometric Approach to Pairwise Bayesian Alignment of Functional Data Using Importance Sampling,” *Electronic Journal of Statistics*, vol. 11, no. 1, pp. 502-531, 2017.
20. W. Xie, S. Kurtek, K. Bharath, Y. Sun, “A Geometric Approach to Visualization of Variability in Functional Data,” *Journal of the American Statistical Association*, vol. 112, no. 519, pp. 979-993, 2017.
19. J. Strait, S. Kurtek, E. Bartha, S. MacEachern, “Landmark-Constrained Elastic Shape Analysis of Planar Curves,” *Journal of the American Statistical Association*, vol. 112, no. 518, pp. 521-533, 2017.
18. A. Saha, S. Banerjee, S. Kurtek, S. Narang, G. Rao, J. Martinez, K. Bharath, A.U.K. Rao, V. Baladandayuthapani, “DEMARCAT: Density-based Magnetic Resonance Image Clustering for Assessing Tumor Heterogeneity in Glioblastoma,” *NeuroImage: Clinical*, vol. 12, pp. 132-143, 2016.

17. S. Kurtek, Q. Xie, C. Samir, M. Canis, "Statistical Model for Simulation of Deformable Elastic Endometrial Tissue Shapes," *Neurocomputing*, vol. 173, no. 1, pp. 36-41, 2016.
16. S. Kurtek, K. Bharath, "Bayesian Sensitivity Analysis with Fisher–Rao Metric," *Biometrika*, vol. 102, no. 3, pp. 601-616, 2015.
15. S. Kurtek, H. Drira, "A Comprehensive Statistical Framework for Elastic Shape Analysis of 3D Faces," *Computers and Graphics (Special Issue of Shape Modeling International 2015)*, vol. 51, pp. 52-59, 2015.
14. J.O. Ramsay, P. Gribble, S. Kurtek, "Description and Processing of Functional Data Arising from Juggling Trajectories," *Special Section, Electronic Journal of Statistics*, vol. 8, no. 2, pp. 1811-1816, 2014.
13. J.O. Ramsay, P. Gribble, S. Kurtek, "Analysis of Juggling Data: Landmark and Continuous Registration of Juggling Trajectories," *Special Section, Electronic Journal of Statistics*, vol. 8, no. 2, pp. 1835-1841, 2014.
12. S. Kurtek, Q. Xie, A. Srivastava, "Analysis of Juggling Data: Alignment, Extraction, and Modeling of Juggling Cycles," *Special Section, Electronic Journal of Statistics*, vol. 8, no. 2, pp. 1865-1873, 2014.
11. Q. Xie, S. Kurtek, A. Srivastava, "Analysis of AneuRisk65 Data: Elastic Shape Registration of Curves," *Special Section, Electronic Journal of Statistics*, vol. 8, no. 2, pp. 1920-1929, 2014.
10. H. Laga, S. Kurtek, A. Srivastava, S.J. Miklavcic, "Landmark-free Statistical Analysis of the Shape of Plant Leaves," *Journal of Theoretical Biology*, vol. 363, pp. 41-52, 2014.
9. C. Samir, S. Kurtek, A. Srivastava, M. Canis, "Elastic Shape Analysis of Cylindrical Surfaces for 3D/2D Registration in Endometrial Tissue Characterization," *IEEE Transactions on Medical Imaging*, vol. 33, no. 5, pp. 1035-1043, 2014.
8. J. Su, S. Kurtek, E. Klassen, A. Srivastava, "Statistical Analysis of Trajectories on Riemannian Manifolds: Bird Migration, Hurricane Tracking, and Video Surveillance," *Annals of Applied Statistics*, vol. 8, no. 1, pp. 530-552, 2014.
7. S. Kurtek, J. Su, C. Grimm, M. Vaughan, R. Sowell, A. Srivastava, "Statistical Analysis of Manual Segmentations of Structures in Medical Images," *Computer Vision and Image Understanding*, vol. 117, no. 9, pp. 1036-1050, 2013.
6. S. Kurtek, W. Wu, G.E. Christensen, A. Srivastava, "Segmentation, Alignment and Statistical Analysis of Biosignals with Application to Disease Classification," *Journal of Applied Statistics*, vol. 40, no. 3, pp. 1270-1288, 2013.
5. S. Kurtek, A. Srivastava, E. Klassen, H. Laga, "Landmark-Guided Elastic Shape Analysis of Spherically-Parameterized Surfaces," *Computer Graphics Forum (Special Issue of Eurographics 2013)*, vol. 32, no. 2, pp. 429-438, 2013.
4. S. Kurtek, A. Srivastava, E. Klassen, Z. Ding, "Statistical Modeling of Curves Using Shapes and Related Features," *Journal of the American Statistical Association*, vol. 107, no. 499, pp. 1152-1165, 2012.
3. S. Kurtek, E. Klassen, J.C. Gore, Z. Ding, A. Srivastava, "Elastic Geodesic Paths in Shape Space of Parameterized Surfaces," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 34, no. 9, pp. 1717-1730, 2012.
2. A. Srivastava, P. Turaga, S. Kurtek, "On Advances in Differential-geometric Approaches for 2D and 3D Shape Analyses and Activity Recognition," *Image and Vision Computing*, vol. 30, no. 6-7, pp. 398-416, 2012.
1. S. Kurtek, E. Klassen, Z. Ding, S.W. Jacobson, J.L. Jacobson, M.J. Avison, A. Srivastava, "Parameterization-invariant Shape Comparisons of Anatomical Surfaces," *IEEE Transactions on Medical Imaging*, vol. 30, no. 3, pp. 849-858, 2011.

*Peer-Reviewed Conference Publications*

22. J. Strait, S. Kurtek, “A Novel Algorithm for Optimal Matching of Elastic Shapes with Landmark Constraints,” *International Conference on Image Processing Theory, Tools and Applications (IPTA)*, Montreal, Canada, December, 2017.
21. H. Laga, S. Kurtek, I.H. Jermyn, A. Srivastava, “Elastic Shape Analysis Using Square-root Normal Field Representation,” *IEEE Conference on Decision and Control*, Melbourne, Australia, December, 2017.
20. S.H. Joshi, Q. Xie, S. Kurtek, A. Srivastava, H. Laga, “Surface Shape Morphometry for Hippocampal Modeling in Alzheimer’s Disease,” *Digital Image Computing Techniques and Applications (DICTA)*, Gold Coast, Australia, November, 2016.
19. C. Samir, S. Kurtek, A. Srivastava, N. Borges, “An Elastic Functional Data Analysis Framework for Preoperative Evaluation of Patients with Rheumatoid Arthritis,” *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Lake Placid, NY, March, 2016.
18. S. Khoualed, A. Sarbinowski, C. Samir, S. Kurtek, C. Hordonneau, “A New Curves-based Method for Adaptive Multimodal Registration,” *International Conference on Image Processing Theory, Tools and Applications (IPTA)*, Orleans, France, November, 2015.
17. S. Kurtek, H. Laga, Q. Xie, “Elastic Shape Analysis of Boundaries of Planar Objects with Multiple Components and Arbitrary Topologies,” *Asian Conference on Computer Vision (ACCV)*, Singapore, November, 2014. **25% acceptance rate**
16. Q. Xie, S. Kurtek, E. Klassen, G.E. Christensen, A. Srivastava, “Metric-based Pairwise and Multiple Image Registration,” *European Conference on Computer Vision (ECCV)*, Zurich, Switzerland, September, 2014. **29% acceptance rate**
15. Q. Xie, I.H. Jermyn, S. Kurtek, A. Srivastava, “Numerical Inversion of SRNFs for Efficient Elastic Shape Analysis of Star-shaped Objects,” *European Conference on Computer Vision (ECCV)*, Zurich, Switzerland, September, 2014. **29% acceptance rate**
14. S. Kurtek, A. Srivastava, “Handwritten Text Segmentation Using Elastic Shape Analysis,” *International Conference on Pattern Recognition (ICPR)*, Stockholm, Sweden, August, 2014. **56% acceptance rate**
13. S. Kurtek, M. Shen, H. Laga, “Elastic Reflection Symmetry Based Shape Descriptors,” *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Steamboat Springs, CO, March, 2014. **40% acceptance rate**
12. S. Kurtek, C. Samir, L. Ouchchane, “Statistical Shape Model of Elastic Endometrial Tissue Surfaces,” *International Conference on Pattern Recognition Applications and Methods (ICPRAM)*, Angers, France, March, 2014. **Selected for full paper oral presentation: 14% acceptance rate**
11. Q. Xie, S. Kurtek, H. Le, A. Srivastava, “Parallel Transport of Deformations Along Paths in Shape Space of Elastic Surfaces,” *International Conference on Computer Vision (ICCV)*, Sydney, Australia, December, 2013. **30% acceptance rate**
10. H. Laga, S. Kurtek, A. Srivastava, S.J. Miklavcic, “Statistical Shape Models of Plant Leaves,” *IEEE Conference on Image Processing (ICIP)*, Melbourne, Australia, September, 2013. **52% acceptance rate**
9. H. Laga, S. Kurtek, A. Srivastava, M. Golzarian, S.J. Miklavcic, “A Riemannian Elastic Metric for Shape-based Plant Leaf Classification,” *Digital Image Computing Techniques and Applications (DICTA)*, Fremantle, Australia, December, 2012. **Selected for oral presentation: 23% acceptance rate**
8. I.H. Jermyn, S. Kurtek, E. Klassen, A. Srivastava, “Elastic Shape Matching of Parameterized Surfaces Using Square Root Normal Fields,” *European Conference on Computer Vision (ECCV)*, Florence, Italy, October, 2012. **25% acceptance rate**
7. S. Kurtek, A. Srivastava, W. Wu, “Signal Estimation Under Random Time-warpings and Nonlinear Signal Alignment,” *Neural Information Processing Systems (NIPS)*, Granada, Spain, December, 2011. **20% acceptance rate**

6. S. Kurtek, E. Klassen, Z. Ding, A. Srivastava, "Parameterization-invariant Shape Statistics and Probabilistic Classification of Anatomical Surfaces," *Information Processing in Medical Imaging (IPMI)*, Irsee, Germany, July, 2011. **Selected for oral presentation: 10% acceptance rate**
5. S. Kurtek, E. Klassen, J.C. Gore, Z. Ding, A. Srivastava, "Classification of Mathematics Deficiency Using Shape and Scale Analysis of 3D Brain Structures," *SPIE Conference on Medical Imaging*, Orlando, FL, February, 2011.
4. G. Kerr, S. Kurtek, A. Srivastava, "A Joint Model for Boundaries of Multiple Anatomical Parts," *SPIE Conference on Medical Imaging*, Orlando, FL, February, 2011.
3. S. Kurtek, E. Klassen, Z. Ding and A. Srivastava, "A Novel Riemannian Framework for Shape Analysis of 3D Objects," *IEEE Computer Vision and Pattern Recognition (CVPR)*, San Francisco, CA, June, 2010. **Selected for oral presentation: 5% acceptance rate**
2. M. Mani, S. Kurtek, C. Barillot, A. Srivastava, "A Comprehensive Riemannian Framework for the Analysis of White Matter Fiber Tracts," *IEEE International Symposium on Biomedical Imaging (ISBI)*, Rotterdam, Holland, April, 2010. **Selected for oral presentation: 15% acceptance rate**
1. C. Samir, A. Srivastava, M. Daoudi, S. Kurtek, "On Analyzing Symmetry of Objects Using Elastic Deformations," *International Conference on Computer Vision Theory and Applications (VISAPP)*, Lisbon, Portugal, February, 2009.

### Peer-Reviewed Workshop Publications

8. J. Strait, S. Kurtek, S.N. MacEachern, "Locally-Weighted Elastic Comparison of Planar Shapes," *International Workshop on DIFF-CVML: Differential Geometry in Computer Vision and Machine Learning, IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshop*, Salt Lake City, UT, June 2018.
7. C. Samir, S. Kurtek, J. Strait, S.H. Joshi, "A Statistical Framework for Elastic Shape Analysis of Spatio-temporal Evolutions of Planar Closed Curves," *International Workshop on DIFF-CVML: Differential Geometry in Computer Vision and Machine Learning, IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshop*, Las Vegas, NV, July 2016. **Selected for oral presentation**
6. J. Strait, S. Kurtek, "Bayesian Model-based Automatic Landmark Detection for Planar Curves," *International Workshop on DIFF-CVML: Differential Geometry in Computer Vision and Machine Learning, IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshop*, Las Vegas, NV, July 2016.
5. J. Zaetz, S. Kurtek, "A Novel Riemannian Framework for Shape Analysis of Annotated Surfaces," *International Workshop on DIFF-CV: Differential Geometry in Computer Vision for Analysis of Shapes, Images and Trajectories, British Machine Vision Conference (BMVC) Workshop*, Swansea, UK, September, 2015.
4. I. Banerjee, H. Laga, G. Patane, S. Kurtek, A. Srivastava, M. Spagnuolo, "Generation of 3D Canonical Anatomical Models: An Experience on Carpal Bones," *Medical Imaging in Rheumatology: Advanced Applications for the Analysis of Inflammation and Damage in the Rheumatoid Joint, International Conference on Image Analysis and Processing (ICIAP) Workshop*, Genoa, Italy, September, 2015.
3. Q. Xie, S. Kurtek, G.E. Christensen, Z. Ding, A. Srivastava, "A Metric-Based Method for Joint Image Registration and Comparison," *International Workshop on Biomedical Image Registration (WBIR)*, Nashville, TN, July, 2012.
2. C. Zhang, G.E. Christensen, S. Kurtek, A. Srivastava, M.J. Murphy, E. Weiss, E. Bai, and J.F. Williamson, "SUPIR: Surface Uncertainty-penalized, Non-rigid Image Registration for Pelvic CT Imaging," *International Workshop on Biomedical Image Registration (WBIR)*, Nashville, TN, July, 2012.
1. S. Kurtek, A. Srivastava, "Elastic Symmetry Analysis of Anatomical Structures," *IEEE International Workshop on Mathematical Methods in Biomedical Image Analysis (MMBIA)*, Breckenridge, CO, January, 2012. **Selected for oral presentation: 22% acceptance rate**

### Book Reviews

1. S. Kurtek, Book Review of "Nonparametric Inference on Manifolds: With Applications to Shape Spaces," *Journal of the American Statistical Association*, vol. 110, no. 509, p. 453, 2015.

*Technical Reports*

1. A. Srivastava, W. Wu, S. Kurtek, E. Klassen, J.S. Marron, “Registration of Functional Data Using Fisher–Rao Metric,” arXiv:1103.3817v2, 2011.

*Book Chapters in Edited Volumes*

5. J. Strait, S. Kurtek, “Landmark-constrained Statistical Shape Analysis of Elastic Curves and Surfaces,” *New Advances in Statistics and Data Science, ICSA Book Series in Statistics*, Ed. D.-G. Chen, Z. Jin, G. Li, Y. Li, A. Liu, Y. Zhao, Springer, 2018.
4. S. Kurtek, I.H. Jermyn, Q. Xie, E. Klassen, H. Laga, “Elastic Shape Analysis of Surfaces and Images,” *Riemannian Computing in Computer Vision*, Ed. P. Turaga and A. Srivastava, Springer, 2016.
3. S. Kurtek, Q. Xie, “Elastic Prior Shape Models of 3D Objects for Bayesian Image Analysis,” *Current Trends in Bayesian Methodology with Applications*, Ed. S.K. Upadhyay, U. Singh, D.K. Dey and A. Loganathan, Taylor & Francis, 2015.
2. A. Srivastava, S. Kurtek, E. Klassen, “Statistical Shape Analysis,” *Computer Vision: A Reference Guide*, Ed. K. Ikeuchi, Springer, 2014.
1. J. Su, S. Kurtek, A. Srivastava, “Joint Registration and Shape Analysis of Curves and Surfaces,” *Shape Perception in Human and Computer Vision: An Interdisciplinary Perspective*, Ed. S. Dickinson and Z. Pizlo, Springer, 2013.

*Peer-Reviewed Conference Abstracts*

3. J. Zaetz, S. Kurtek, “A Riemannian Approach to Joint Shape and Texture Analysis of 3D Objects,” *Conference on Computational Modeling of Objects Presented in Images: Fundamentals, Methods, and Applications (CompIMAGE)*, Pittsburgh, PA, September, 2014.
2. C. Zhang, G.E. Christensen, S. Kurtek, A. Srivastava, E. Weiss, M.J. Murphy, and J.F. Williamson, “A Non-rigid Image Registration Algorithm that Accommodates Organ Segmentation Error,” *The American Association of Physicists in Medicine (AAPM) Annual Meeting*, Charlotte, NC, July, 2012.
1. S. Kurtek, E. Klassen, A. Srivastava, Z. Ding, S.W. Jacobson, J.L. Jacobson, M.J. Avison, “A Novel Parameterization-Invariant Riemannian Framework for Comparing Shapes of 3D Anatomical Structures,” *International Society for Magnetic Resonance in Medicine (ISMRM)*, Stockholm, Sweden, May, 2010.

*Manuscripts Under Review/Revision*

7. G. Qadir, Y. Sun, S. Kurtek, “Estimation of Spatial Deformation for Non-stationary Processes via Variogram Alignment,” In Review, 2018.
6. W. Xie, O. Chkrebti, S. Kurtek, “Visualization and Outlier Detection for Multivariate Elastic Curve Data,” In Review, 2018.
5. S. Kurtek, T. Needham, “Simplifying Transforms for General Elastic Metrics on the Space of Plane Curves,” In Review, 2018.
4. J.D. Tucker, J.R. Lewis, C. King, S. Kurtek, “A Geometric Approach for Computing Tolerance Bounds for Elastic Functional Data,” In Review, 2018.
3. T. Deregnaucourt, C. Samir, S. Kurtek, A.-F. Yao, “Shape-constrained Surface Reconstruction and Multimodal, Non-rigid Image Registration,” In Review, 2018.
2. K. Bharath, S. Kurtek, “Distribution on Warp Maps for Alignment of Open and Closed Curves,” In Review After Major Revision, 2017.
1. A. Saha, K. Bharath, S. Kurtek, “A Geometric Variational Approach to Bayesian Inference,” In Review After Major Revision, 2017.

## Presentations

### *Invited Presentations*

41. *Geometric Methods for Image-based Statistical Analysis of Brain Tumors*, Department of Biostatistics, Columbia University, New York, NY, October, 2018.
40. *Applications of Elastic Functional and Shape Data Analysis*, CBMS Conference on Elastic Functional and Shape Data Analysis, Mathematical Biosciences Institute (MBI), Columbus, OH, July, 2018.
39. *Radiologic Image-based Statistical Shape Analysis of Brain Tumors*, International Indian Statistical Association (IISA) Conference on Statistics, Gainesville, FL, May, 2018.
38. *Statistical Shape Analysis of Surfaces Using Square Root Normal Fields*, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, Notre Dame, IN, April, 2018.
37. *Radiologic Image-based Statistical Shape Analysis of Brain Tumors*, ENAR Spring Meeting, Atlanta, GA, March, 2018.
36. *Radiologic Image-based Statistical Shape Analysis of Brain Tumors*, AMS Spring Sectional Meeting, Columbus, OH, March, 2018.
35. *Statistical Shape Analysis of Surfaces Using Square Root Normal Fields*, Visitor Seminar, Mathematical Biosciences Institute (MBI), Columbus, OH, November, 2017.
34. *Bayesian Registration of Functions with a Gaussian Process Prior*, Workshop on Applications-Driven Geometric Functional Data Analysis, Florida State University, Tallahassee, FL, October, 2017.
33. *Registration of Functional Data Using the Fisher-Rao Metric*, Joint Statistical Meetings (JSM), Baltimore, MD, August, 2017.
32. *A Geometric Approach to Bayesian Alignment of Functional Data*, International Conference on Computational and Methodological Statistics (CMStatistics), Seville, Spain, December, 2016.
31. *Statistical Shape Analysis of 3D Objects Using Square Root Normal Fields*, Workshop on Topological, Geometric and Statistical Techniques in Biological Data Analysis, Mathematical Biosciences Institute (MBI), Columbus, OH, September, 2016.
30. *Statistical Shape Analysis of 3D Objects in the Presence of Hard and Soft Landmark Constraints*, Joint Statistical Meetings (JSM), Chicago, IL, August, 2016.
29. *Statistical Shape Analysis of Anatomical Structures Using Square-Root Normal Fields*, International Chinese Statistical Association (ICSA) Applied Statistics Symposium, Atlanta, GA, June, 2016.
28. *Statistical Shape Analysis of Elastic Curves and Surfaces*, Department of Biostatistics, University of Texas MD Anderson Cancer Center, Houston, TX, March, 2016.
27. *Discussion on Role of Registration in Statistical Shape Analysis*, Functional Imaging Working Group, Program on Challenges in Computational Neuroscience, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, December, 2015. (Remote Presentation)
26. *Bayesian Sensitivity Analysis with Fisher-Rao Metric*, Statistical Shape Analysis and Modeling Group (SSAMG), Department of Statistics, Florida State University, Tallahassee, FL, September, 2015. (Remote presentation)
25. *Geometric Approach to Pairwise Bayesian Alignment of Functional Data Using Importance Sampling*, International Congress on Industrial and Applied Mathematics (ICIAM), Beijing, China, August, 2015.
24. *Elastic Statistical Shape Models of Anatomical Surfaces Using Square-Root Normal Fields*, Meeting of the Statistical Society of Canada (SSC), Halifax, Canada, June, 2015.
23. *Statistical Model for Simulation of Deformable Elastic Endometrial Tissue Shapes*, Statistical Methods in Imaging Workshop, Department of Biostatistics, University of Michigan, May, 2015.
22. *Statistical Shape Analysis of Anatomical Surfaces Using Square-Root Normal Fields*, Joint Biostatistics Symposium, Case Western Reserve University, Cleveland, OH, April, 2015.



21. *Bayesian Sensitivity Analysis with Fisher–Rao Metric*, Department of Statistics, The Ohio State University, Columbus, OH, September, 2014.
20. *Discussion on Functional Data Analysis: Beyond the Standard Paradigm*, Joint Statistical Meetings (JSM), Boston, MA, 2014.
19. *Statistical Shape Analysis of Elastic Surfaces*, Conference of the International Indian Statistical Association (IISA), Riverside, CA, July, 2014.
18. *Elastic Statistical Shape Models of 3D Objects*, Institute of Mathematical Statistics (IMS) Asia Pacific Rim Meeting (APRM), Taipei, Taiwan, June, 2014.
17. *Elastic Statistical Shape Analysis of 3D Objects Using Square Root Normal Fields*, American Mathematical Society (AMS) Spring Central Sectional Meeting, Lubbock, TX, April, 2014.
16. *Elastic Statistical Shape Analysis of 3D Objects Using Square Root Normal Fields*, ENAR Spring Meeting, Baltimore, MD, March, 2014. (Poster)
15. *Elastic Statistical Shape Analysis of 3D Objects Using Square Root Normal Fields*, Workshop on Morphogenesis, Regeneration and the Analysis of Shape, Mathematical Biosciences Institute (MBI), Columbus, OH, February, 2014.
14. *Discussion on Role of Registration in Statistical Shape Analysis*, Image Registration Working Group, Summer Program on Neuroimaging Data Analysis, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, June, 2013.
13. *Statistical Models on Shape Spaces of Parameterized Curves and Surfaces*, International Society for Bayesian Analysis (ISBA) Regional Meeting and International Workshop/Conference on Bayesian Theory and Applications, Varanasi, India, January, 2013.
12. *Registration of Surfaces Using Square-Root Functions and Square-Root Normal Fields*, Workshop on Statistics of Time Warpings and Phase Variations, Mathematical Biosciences Institute (MBI), Columbus, OH, November, 2012.
11. *Analysis of Juggling Trajectories Using Square-Root Slope and Velocity Functions*, Workshop on Statistics of Time Warpings and Phase Variations, Mathematical Biosciences Institute (MBI), Columbus, OH, November, 2012.
10. *Statistical Analysis of Functions, Curves and Surfaces*, Department of Computer Science and Engineering, The Ohio State University, Columbus, OH, October, 2012.
9. *Statistical Analysis of Images and Parameterized Surfaces*, Joint Statistical Meetings (JSM), San Diego, CA, July, 2012.
8. *Statistical Analysis of Functions, Curves and Surfaces*, Department of Information Systems, Statistics, and Management Science, University of Alabama, Tuscaloosa, AL, January, 2012.
7. *Statistical Analysis of Functions, Curves and Surfaces*, Department of Statistics, The Ohio State University, Columbus, OH, January, 2012.
6. *Riemannian Shape Analysis of Functions, Curves and Surfaces*, Department of Mathematical Sciences, Binghamton University, Binghamton, NY, November, 2011.
5. *Statistical Shape Analysis of Elastic Anatomical Surfaces*, Geometry for Anatomy Workshop, Banff, Canada, August, 2011.
4. *Registration of Functional Data Using Fisher–Rao Metric*, Program on Analysis of Object Data Transition Workshop, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, June, 2011.
3. *Detection of Functional Abnormalities in the Brain Using Statistical Shape Analysis of Subcortical Structures*, Interface 2011: Statistical, Machine Learning, and Visualization Algorithms, Cary, NC, June, 2011.

2. *A Riemannian Framework for Functional Analysis in Presence of Time Warping*, Statistical Inference for Functional Data Working Group, Program on Analysis of Object Data, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, October, 2010. (Remote Presentation)
1. *A Theory for Statistical Analysis of Shapes of Curves and Surfaces: An Overview*, Southern Regional Council on Statistics (SRCOS), Virginia Beach, VA, June, 2010.

### Contributed Presentations

10. *Current and Future Role of Topological and Geometric Methods for Data Analysis*, Second TRIPODS PI Meeting, University of California, Santa Cruz, Silicon Valley Campus, Santa Clara, CA, October, 2018.
9. *Elastic Statistical Shape Analysis of 3D Objects Using Square Root Normal Fields*, Workshop on Topological Data Analysis, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, February, 2014. (Poster)
8. *Elastic Shape Matching of Parameterized Surfaces Using Square Root Normal Fields*, Program on Neuroimaging Data Analysis, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, June, 2013. (Poster)
7. *Segmentation, Alignment and Statistical Analysis of Biosignals with Application to Disease Classification*, Workshop on Statistics of Time Warpings and Phase Variations, Mathematical Biosciences Institute (MBI), Columbus, OH, November, 2012. (Poster)
6. *Statistical Shape Analysis of Anatomical Surfaces*, Network of Greater Georgia Institutions for Neuroimaging and Statistics (NOGGINS) Workshop, Athens, GA, April, 2012.
5. *Geometric Modeling in Shape Space*, Statistical Shape Analysis and Modeling Group (SSAMG), Department of Statistics, Florida State University, Tallahassee, FL, April, 2012.
4. *Shape Analysis of Curves and Surfaces: Exploring Different Applications*, Statistical Shape Analysis and Modeling Group (SSAMG), Department of Statistics, Florida State University, Tallahassee, FL, November, 2011.
3. *Parameterization-invariant Shape Statistics and Probabilistic Classification of Anatomical Surfaces*, Program on Analysis of Object Data Transition Workshop, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, June, 2011. (Poster)
2. *Riemannian Framework for Shape Analysis of 3D Objects*, Program on Analysis of Object Data Opening Workshop, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, September, 2010. (Poster)
1. *A Novel Riemannian Framework for Shape Analysis of 3D Objects*, Florida Chapter of the American Statistical Association (ASA), Tallahassee, FL, February, 2010.
0. *On Analyzing Symmetry of Objects Using Elastic Deformations*, Florida Chapter of the American Statistical Association (ASA), Orlando, FL, February, 2009.

### Tutorials

*Statistical Shape Analysis*, TGDA@OSU TRIPODS Center Summer School: Theory and Foundations of TGDA, Columbus, OH, May 2018

*Statistical Image (Shape) Analysis*, Research Experience for Undergraduates (REU) Opening Workshop, Mathematical Biosciences Institute (MBI), Columbus, OH, June 2016, May 2015, 2014, 2013.

*Exploring Statistical Methods for Facial Recognition Using Images*, Research Experience for Undergraduates (REU) Opening Workshop, Mathematical Biosciences Institute (MBI), Columbus, OH, June 2016, May 2015, 2014, 2013.

## Course Preparation

*Instructor of Record, Department of Statistics, The Ohio State University*

STAT 8820: Shape Data Analysis, Fall 2018

STAT 6750: Statistical Consulting and Collaboration, Spring 2016

STAT 3201: Introduction to Probability for Data Analytics, Spring 2018, Fall 2017, Spring 2017, Fall 2016, Fall 2015, Fall 2014

STAT 2480: Statistics for the Life Sciences, Spring 2015, Spring 2013

STAT 7730: Advanced Computational Statistics, Fall 2014, Fall 2013, Fall 2012

*Department of Statistics, Florida State University*

Instructor of Record, STA 2122: Introduction to Applied Statistics, Spring 2009, Fall 2008, Summer 2008

Teaching Assistant, STA 2023: Fundamentals of Business Statistics, Spring 2008, Fall 2007

## Advising

*Former Students*

Jiaqi Zaetz, Ph.D. in Statistics, Fall 2015, Thesis Title: A Riemannian Framework for Shape Analysis of Annotated 3D Objects, Current Position: Vice President, Financial Analysis, JP Morgan Chase

Yi Lu (co-advised with Radu Herbei), Ph.D. in Statistics, Summer 2017, Thesis Title: Function Registration from a Bayesian Perspective, Current Position: Assistant Professor, Department of Mathematics and Computer Science, Drew University

Weiyi Xie, Ph.D. in Statistics, Summer 2017, Thesis Title: A Geometric Approach to Visualization of Variability in Univariate and Multivariate Functional Data, Current Position: Senior Biostatistician, Abbott Laboratories

Justin Strait, Ph.D. in Statistics, Summer 2018, Thesis Topic: Elastic Statistical Shape Analysis with Landmark Constraints, Current Position: Assistant Professor, Department of Statistics, University of Georgia

*Current Students*

Abhijoy Saha, Ph.D. in Statistics, Expected Graduation: Summer 2019, Thesis Topic: Modeling and Inference Using the Nonparametric Fisher–Rao metric

Min Ho Cho, Ph.D. in Statistics, Expected Graduation: Summer 2020, Thesis Topic: Classification of Elastic Shapes

Xiao Zang, Ph.D. in Biostatistics, Expected Graduation: Summer 2020, Thesis Topic: Clustering of Functions Coming from Posterior Samples in Terms of Amplitude and Phase

James Matuk, Ph.D. in Statistics, Expected Graduation: Summer 2021

*Member, Ph.D. Candidacy Examination Committee*

Liubo Li, Statistics, Summer 2016

Anna Smith, Statistics, Fall 2015

Andrew Olsen, Statistics, Fall 2014

Zhengyu (Rex) Hu, Statistics, Spring 2014

Taylor Blake, Statistics, Spring 2013

*Member, Ph.D. Final Examination Committee*

Taylor Blake, Statistics, Spring 2018

Mengyuan Fan, Food Science and Technology, Spring 2018 (Graduate Faculty Representative)

Liubo Li, Statistics, Summer 2017

Anna Smith, Statistics, Spring 2017

Xiaotong Liu, Computer Science and Engineering, Summer 2016 (Graduate Faculty Representative)

Kenji Oman, Physics, Summer 2015 (Graduate Faculty Representative)

Andrew Olsen, Statistics, Spring 2015

Zhengyu (Rex) Hu, Statistics, Spring 2015

*Undergraduate Research Advising*

Harrison Weissman (Tufts University), Mathematical Biosciences Institute (MBI) Research Experience for Undergraduates (REU), Research Topic: Classifying Proteins by Degree of Symmetry and Properties of Amino Acids (Oral and Poster Presentations at the MBI Capstone Conference), Summer 2016

Robert MacKay (Tulane University), Mathematical Biosciences Institute (MBI) Research Experience for Undergraduates (REU), Research Topic: Increasing Predictive Accuracy of Facial Recognition Technology with Sparse Principal Component Analysis (Oral and Poster Presentations at the MBI Capstone Conference), Summer 2015

Mo Shen (Dickinson College and New York University), Mathematical Biosciences Institute (MBI) Research Experience for Undergraduates (REU), Research Topics: Shape Representation via Rotational Descriptors, Elastic Shape Descriptors Based on Reflection Symmetry (Oral and Poster Presentations at the MBI Capstone Conference), Summer 2014, 2013

**Service***Department*

Exam Committees: Member, Biostatistics Ph.D. Qualifying Exam II, Summer 2018-Present (Offerings: 06/2018); Member, Ph.D. Qualifying Exam II, Summer 2017-Present (Offerings: 08/2017, 01/2018); Member, Ph.D. Qualifying Exam I, Summer 2015-Present (Offerings: 08/2015, 05/2016, 08/2016, 05/2017); Member, Master of Applied Statistics Exam, Fall 2012-Spring 2015 (Offerings: 11/2012, 01/2013, 01/2014, 05/2014, 01/2015, 05/2015)

Curriculum Committees: Member, Data Analytics Major, Fall 2015-Present; Member, Undergraduate Major Curriculum, Fall 2014-Spring 2015; Member, Biostatistics Curriculum, Spring 2015-Summer 2015;

Other Committees: Member, Graduate Admissions, Fall 2017-Present; Member, Colloquium, Fall 2015-Spring 2017; Member, Computer Advisory, Fall 2014-Spring 2017; Member, Director of the Statistical Consulting Service Search, Spring 2016

*University*

Mentor, DataFest, Spring 2018, 2017, 2016

Abstract Judge, Edward F. Hayes Research Forum, Spring 2018, 2017, 2016, 2015, 2014, 2013

Poster Judge, Denman Undergraduate Research Forum, Spring 2018, 2017, 2015

Member, Mathematical Biosciences Institute (MBI) Local Scientific Advisory Committee, Fall 2014-Present

Member, Mathematical Biosciences Institute (MBI) Research Experience for Undergraduates (REU) Selection Committee, Spring 2015

*Professional*

Proposal Reviewer: National Science Foundation (NSF), FRIAS Junior Fellowship

Journal Reviewer: IEEE Trans. on Automatic Control, Journal of Applied Statistics, NeuroImage, IEEE Trans. on Pattern Analysis and Machine Intelligence, Journal of Computational and Graphical Statistics, Journal of the American Statistical Association (T&M, A&CS), IEEE Trans. on Image Processing, Journal of Mathematical Imaging and Vision, Electronic Journal of Statistics, Journal of the Royal Statistical Society (Series B & C), Journal of Machine Learning Research, Pattern Recognition Letters, IETE Technical Review, Technometrics, Biometrics, Biometrika, IET Computer Vision, International Journal of Computer Vision, IEEE Trans. on Medical Imaging, ACM Trans. on Graphics, Communications in Statistics (T&M), Environmental and Ecological Statistics, Annals of Applied Statistics, Econometrics and Statistics, Innovation and Research in Biomedical Engineering, Computational Biology and Chemistry, Sankhya B, Statistical Science, Stat, ACM Trans. on Multimedia Computing Communications and Applications, Statistica Sinica, Computational Statistics and Data Analysis, Statistics in Medicine, Statistics in Biosciences, Applied Stochastic Models in Business and Industry

Conference Area Chair: 2018, 2016 IEEE Winter Conference on Applications of Computer Vision (WACV), Algorithms Track

Conference Reviewer: 2017 IEEE Conference on Decision and Control (CDC); 2017 MICCAI; 2017 IEEE Winter Conference on Applications of Computer Vision (WACV); 2018, 2017, 2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR); 2016 Asian Conference on Computer Vision (ACCV); 2016, 2014 International Conference on Pattern Recognition (ICPR); 2018, 2016 European Conference on Computer Vision (ECCV); 2017, 2015 International Conference on Computer Vision (ICCV)

Scientific Program Committee Member: 2018 Workshop on DIFF-CVML: Differential Geometry in Computer Vision and Machine Learning; 2017 ICCV International Workshop on Manifold Learning: from Euclid to Riemann; 2017 International Conference on Intelligent Systems and Computer Vision (ISCV); 2016 International Workshop on Representation, Analysis and Recognition of Shape and Motion from Imaging Data (RFMI); 2017, 2015 Thematic Conference on Computational Vision and Medical Image Processing (VipIMAGE); 2017, 2015 Conference on Information Processing in Medical Imaging (IPMI); 2014 Conference on Computational Modeling of Objects Presented in Images: Fundamentals, Methods, and Applications (CompIMAGE); 2018, 2014, 2012 International Workshop on Biomedical Image Registration (WBIR); 2013, 2012 MICCAI Workshop on Mesh Processing in Medical Image Analysis

Workshop Organizer: (with T. Dey, M. Kahle, F. Memoli, D. Sivakoff and Y. Wang) TGDA@OSU TRIPODS Center Workshop and Summer School on Theory and Foundations of TGDA; (with H. Drira, P. Turaga, V. Murino, M. Ha Quang and M. Harandi) Third International Workshop on DIFF-CVML: Differential Geometry in Computer Vision and Machine Learning in conjunction with the 2017 IEEE Conference on Computer Vision and Pattern Recognition (CVPR); (with H. Drira, P. Turaga and A. Srivastava) Second International Workshop on DIFF-CVML: Differential Geometry in Computer Vision and Machine Learning in conjunction with the 2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR); (with H. Drira and P. Turaga) First International Workshop on DIFF-CV: Differential Geometry in Computer Vision for Analysis of Shapes, Images and Trajectories in conjunction with the 2015 British Machine and Vision Conference (BMVC)

Session Organizer: (with T. Needham) *Geometric Methods in Shape Analysis*, Contributed Session, 2018 AMS Spring Sectional Meeting; (with K. Bharath) *Geometric Approaches to Functional Data Analysis for Biomedical Applications*, Invited Session, 2018 ENAR Spring Meeting; *Manifold-Valued Data Analysis for High-Dimensional Biomedical Datasets*, Invited Session, 2016 Joint Statistical Meetings (JSM); (with G. Rempala) *Minisymposium on Statistical Inference for Constrained Stochastic Dynamical Systems*, 2015 International Congress on Industrial and Applied Mathematics (ICIAM); *Geometric Approaches to Statistical Analysis of Biological Structures*, Topic-Contributed Session, 2014 Joint Statistical Meetings (JSM)

Session Chair: 2016 International Chinese Statistical Association (ICSA) Applied Statistics Symposium; 2015 International Congress on Industrial and Applied Mathematics (ICIAM); 2015 International Workshop on DIFF-CV: Differential Geometry in Computer Vision for Analysis of Shapes, Images and Trajectories; 2014 International Conference on Pattern Recognition Applications and Methods (ICPRAM); 2014 Institute of Mathematical Statistics (IMS) Asia Pacific Rim Meeting (APRM); 2014 Conference of the International Indian Statistical Association (IISA); 2014 Joint Statistical Meetings (JSM)

## Professional Memberships

Institute of Mathematical Statistics (IMS), Spring 2014-Present

Institute of Electrical and Electronics Engineers (IEEE), Spring 2010-Present

Senior Member, Spring 2018-Present

American Statistical Association (ASA), Fall 2007-Present

Florida Chapter, Fall 2007-Fall 2012

Institute for Systems and Technologies of Information, Control and Communication (INSTICC), Spring 2014-Spring 2015

## Miscellaneous

### *Computer Skills*

Statistical Software: MATLAB, R, S-Plus; some experience with STATA, SAS, SPM, Minitab

Application Software: Latex, Microsoft Word, Excel, Powerpoint, Access, Works

### *Foreign Languages*

Polish (native)