Tolga Tasdizen

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EDUCATION

- Ph.D. in Engineering, Brown University, Providence, RI 2001
- M.S. in Engineering, Brown University, Providence, RI 1997
- B.S. in Electrical Engineering, Bogazici University, Istanbul, Turkey 1995

WORK EXPERIENCE

- Assistant Professor, Electrical and Computer Engineering 2008 - present
  Assistant Professor, Scientific Computing and Imaging Institute
  University of Utah, Salt Lake City, UT
- Adjunct Assistant Professor, School of Computing 2008 - present
  University of Utah, Salt Lake City, UT
- Adjunct Assistant Professor, Department of Neurology 2006 - present
  Adjunct Faculty Member, Center for Alzheimer's Care, Imaging and Research
  University of Utah, Salt Lake City, UT
- Research Assistant Professor, School of Computing 2004 - 2008
  University of Utah, Salt Lake City, UT
- Postdoctoral Research Scientist, Scientific Computing and Imaging Institute 2001 - 2004
  University of Utah, Salt Lake City, UT

RESEARCH INTERESTS

- Image processing and pattern recognition with a focus on applications in biomedical imaging.
- Analysis of data supported on low-dimensional manifolds in high-dimensional spaces, particularly in image analysis and filtering applications.
- Neural circuit reconstruction with serial-section transmission electron microscopy imaging.
- Supervised and unsupervised classification problems in medical image analysis such as the diagnosis of dementing illnesses from positron emission tomography (PET).

RESEARCH GRANTS (PI)

- Large-scale computational reconstruction of three-dimensional neural connectivity from serial-section microscopy
  PI: Tolga Tasdizen
  Funding agency: NIH
  Program: NSF/NIH Collaborative Research in Computational Neuroscience program
  Award $1,200,000, 2005 - 2010 (supporting 1 Ph.D, 1 M.S student and 1 post-doc)

- A Software Framework for Processing, Visualization, and Analysis of High-Resolution Microscopy Data
  PI: Tasdizen
  Funding Agency: University of Utah
  Program: Technology Commercialization
  Award: $30,000, 2008-2009

RESEARCH GRANTS (coPI)

- High-Dimensional, Nonparametric Density Estimation for the Analysis of Images and Shapes
  PI: Ross Whitaker, School of Computing, University of Utah
  Co-PIs: Tolga Tasdizen, Jared Tanner, Davar Khoshnevisan
  Funding Agency: NSF
  Program: Mathematical Sciences: Innovations at the Interface with Computer Sciences
  Award: $474,000, 2008 - 2011 (Tasdizen: co-advising 1 Ph.D. student)

RESEARCH GRANTS (Senior Personnel)

- Prevention of Hemodialysis Vascular Access Stenosis
  PI: Alfred Cheung, Department of Internal Medicine, University of Utah
  Funding Agency: NIH
  Award: $5.5M, 2006-2011, (Tasdizen: approximately $200K share, co-advising 1 M.S. student)

- Model-based Reconstruction for Dynamic MRI
  PI: Edward Di Bella, Department of Radiology, University of Utah
  Funding Agency: NIH
  Award: $1.65M, 2007 - 2011 (Tasdizen: advising 1 Ph.D. student)

PATENTS

- L. Grady, T. Tasdizen and R. Whitaker, "System and Method for Image Segmentation by Solving an Inhomogeneous Dirichlet Problem", United States Patent 7,542,604, June 2009.

INVENTION DISCLOSURES

- T. Tasdizen and R. Whitaker, "An Advanced Solver for the Diffusion Equation with Spatially Varying Coefficients," University of Utah Invention Disclosure, U-3750.

- T. Tasdizen and R. Whitaker, "Implicit Surface Representations for Fluids from Particle Simulations," University of Utah Invention Disclosure, U-4128.

- P. Koshevoy, T. Tasdizen, R. Whitaker, B. Jones and R. Marc, "IR-Tweak, IR-Mosaic", University of Utah Invention Disclosure, U-4275.

- T. Tasdizen and A. Paiva, "Robust Fingerprint Analysis Using Manifold Topology", University of Utah Invention Disclosure, U-4549.

TEACHING

- *Probability and Statistics for Engineers*, Undergraduate level, Electrical and Computer Engineering, University of Utah, Spring 2009

- *Digital Image Processing*, Graduate level, Electrical and Computer Engineering, University of Utah, Fall 2008

- *Machine Learning*, Graduate and Undergraduate level, Computer Science, University of Utah, Spring 2006
- Organized the *Scientific Computing and Imaging Seminar Series*, University of Utah, Fall 2007 & Spring 2008

STUDENTS GRADUATED

- Neda Sadeghi, M.S. in Computational Engineering and Science (2008), *Automatic Classification of Alzheimer's Disease and Frontotemporal Dementia: A Decision Tree Approach with FDG-PET imaging*.
- Kannan Umadevi Venkataraju, M.S. Computer Science (2009), *Automatic Markup of Neural Cell Membranes Using Boosted Decision Stumps*.
- Samuel Preston, M.S. Computer Science (2009), *Processing of MRI Data for Simulation and Monitoring of Drug Delivery*.
- Deepak Antony, M.S. in Computational Engineering and Science (2009), *non-thesis option*.

CURRENT STUDENTS

- Elizabeth Jurrus, Ph.D. candidate, School of Computing
- Samuel Gerber, Ph.D. candidate, School of Computing
- Srikant Kamesh Iyer, Ph.D. candidate, Electrical and Computer Engineering

POSTDOCTORAL RESEARCHERS

- Antonio R. Paiva, Ph.D. University of Florida

PROFESSIONAL ACTIVITIES

- IEEE Signal Processing Society, Bio imaging and Signal Processing (BISP) Technical Committee Associate Member, 2009-present
- Track area chair, 20^{th} International Conference on Pattern Recognition; *Pattern Recognition and Machine Learning Track* area chair, 2010
- Program committee, International Symposium CompIMAGE 2010
- Program chair, Fourth International Workshop on *Microscopic Image Analysis with Applications in Biology*, NIH Campus, Bethesda, MD, 2009.
- 6^{th} IEEE International Symposium on Biomedical Imaging (ISBI): From Nano to Macro; *Electron Microscopy* session chair, 2009.
- Organizing committee, MICCAI 2008 Workshop: *Microscopic Image Analysis with Applications in Biology*.
- Program committee, MICCAI 2006 Workshop: *Microscopic Image Analysis with Applications in Biology*.
- Panelist and reviewer for joint National Science Foundation (NSF) and National Institutes of Health (NIH) *Collaborative Research in Computational Neuroscience* program, 2006, 2008 and 2009.

- Reviewer for: IEEE Transactions on Image Processing, IEEE Transactions on Pattern Analysis and Machine Intelligence, Medical Image Analysis, IEEE Transactions on Medical Imaging, IEEE Transactions on Visualization and Computer Graphics, Medical Image Computing and Computer-Assisted Intervention (MICCAI), IEEE Visualization, Journal of Neuroscience Methods, Journal of Mathematical Imaging and Vision, Pattern Analysis and Applications, ACM Solid Modeling, SIAM Journal of Scientific Computing, VisSym, Eurographics, Journal of Electronic Imaging, The Visual Computer, SIGGRAPH Asia, Elsevier Methods.

AWARDS

- Best Student Paper Award Honorable Mention, 15th IEEE Computer Society International Conf. on Pattern Recognition

MEMBERSHIPS

- Senior Member IEEE, IEEE Signal Processing Society and IEEE Computer Society

PUBLICATIONS

- **Journal**

1. T. Tasdizen, "Principal Neighborhood Dictionaries for Non-local Means Image Denoising," IEEE Transactions on Image Processing, in press.
2. J. R. Anderson, B. W. Jones, J-H Yang, C. B. Watt, P. Koshevoy, J. Spaltenstein, U. V. Kannan, R. Whitaker, D. Mastronarde, T. Tasdizen and R. E Marc, "A Computational Framework for Ultrastructural Mapping of Neural Circuitry," PLoS Biology, vol. 7, no. 3, pp. e74, March 2009.
3. J. S. Preston, T. Tasdizen, C. M. Terry, A. K. Cheung and R. M. Kirby, "Using the Stochastic Collocation Method for the Uncertainty Quantification of Drug Concentration due to Depot Shape Variability," IEEE Trans. Biomedical Engineering, Vol. 56, no. 3, pp. 609-619, 2009.
4. E. Jurrus, T. Tasdizen, P. Koshevoy, P. T. Fletcher, M. Hardy, C. Chien, W. Denk, and R. Whitaker, "Axon Tracking in Serial Block-Face Scanning Electron Microscopy," ; Medical Image Analysis, Volume 13, Issue 1, pp. 180-188, February 2009.
5. 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 F-fluorodeoxyglucose to improve the treatment of Alzheimer's disease," The Journal of the Alzheimer's Association, Vol 4:1, Suppl. 1, pp. 29–36, 2008.
6. G. Adluru, S. P. Awate, T. Tasdizen, R. T. Whitaker and E. V. R. DiBella, "Temporally Constrained Reconstruction of Dynamic Cardiac Perfusion MRI," Magnetic Resonance in Medicine, 57, pp. 1027-1036, 2007.
7. O. Nemitz, T. Tasdizen, M. Rumpf and R. T. Whitaker, "Anisotropic Curvature Motion for Structure Enhancing Smoothing of 3D MR Angiography Data," Journal of Mathematical Imaging and Vision, 7:3, pp 217-229, 2007.
8. S. P. Awate, T. Tasdizen, N. L. Foster and R. T. Whitaker, "Adaptive, Nonparametric Markov Modeling for Unsupervised, MRI Brain-Tissue Classification," Medical Image Analysis, 10:5, pp. 726-739, 2006.
9. T. Tasdizen and R. T. Whitaker, "Higher-order nonlinear priors for surface reconstruction", IEEE Transactions on Pattern Analysis and Machine Intelligence, 26:7, pp. 878–891, 2004.

10. T. Tasdizen, R. T. Whitaker, P. Burchard and S. Osher, “Geometric Surface Processing via Normal Maps”, ACM Transactions on Graphics, 22:4, pp. 1012-1033, 2003.
11. T. Tasdizen, J.-P. Tarel and D. B. Cooper, “Improving the Stability of Algebraic Curves for Applications”, IEEE Transactions on Image Processing, 9:3, pp. 405–416, 2000.
12. T. Tasdizen, L. Akarun and C. Ersoy, “Color Quantization with Genetic Algorithms”, Signal Processing: Image Communication, Elsevier, Vol. 12, pp. 49–57, 1998.

- **Conference**

13. E. Jurrus, A. R. C. Paiva, S. Watanabe, R. Whitaker, E. M. Jorgensen and T. Tasdizen, ”Serial Neural Network Classifier for Membrane Detection using a Filter Bank,” to appear in Microscopic Image Analysis with Applications in Biology, 2009.
14. S. Gerber, T. Tasdizen and R. T. Whitaker, ”Dimensionality Reduction and Principal Surfaces via Kernel Map Manifolds,” to appear in ICCV 2009.
15. S. Gerber, T. Tasdizen, S. Joshi and R. T. Whitaker, ”On the Manifold Structure of the Space of Brain Images” to appear in MICCAI 2009.
16. K.. U. Venkataraju, A. Paiva, E. Jurrus. T. Tasdizen, ”Automatic Markup of Neural Cell Membranes using Boosted Decision Stumps,” IEEE International Symposium on Biomedical Imaging (ISBI): From Nano to Macro, 2009
17. J. Anderson, B. Jones, J. H. Yang, M. Shaw, C. Watt, P. Koshevoy, J. Spaltenstein, E. Jurrus, K. U. Venkataraju, R. Whitaker, D. Mastronarde, T. Tasdizen, R. Marc, ”Ultrastructural mapping of neural circuitry: A computational framework,” IEEE International Symposium on Biomedical Imaging (ISBI): From Nano to Macro, 2009
18. T. Tasdizen, E. Jurrus and R. T. Whitaker, ”Non-uniform Illumination Correction in Transmission Electron Microscopy,” MICCAI Workshop on Microscopic Image Analysis with Applications in Biology, 2008.
19. T. Tasdizen, ”Principal components for non-local means image denoising,” Proceedings of International Conference on Image Processing (ICIP), 2008.
20. N. Sadeghi, N. L. Foster, A. Y. Wang, S. Minoshima, A. P. Lieberman and T. Tasdizen, ”Automatic Classification of Alzheimer’s Disease vs. Frontotemporal Dementia: A Spatial Decision Tree Approach with FDG-PET,” in Proceedings of IEEE International Symposium on Biomedical Imaging (ISBI): From Nano to Macro, pp. 408-411, 2008.
21. E. Jurrus, R. T. Whitaker, B. W. Jones, R. E. Marc and T. Tasdizen, ”An Optimal-Path Approach for Neural Circuit Reconstruction,” in Proceedings of IEEE International Symposium on Biomedical Imaging (ISBI): From Nano to Macro, pp. 1609-1612, 2008.
22. S. Gerber, T. Tasdizen and R. T. Whitaker, ”Robust Non-linear Dimensionality Reduction using Successive 1-Dimensional Laplacian Eigenmaps,” in Proceedings of International Conference on Machine Learning (ICML), pp. 281-288, 2007.
23. T. Tasdizen, P. Koshevoy, B. W. Jones, R. T. Whitaker and R. E. Marc, “Assembly of Large Three-Dimensional Volumes from Serial-Section Transmission Electron Microscopy,” in Proceedings of MICCAI Workshop on Microscopic Image Analysis with Applications in Biology, pp. 10-17, 2006.
24. E. Jurrus, T. Tasdizen, P. Koshevoy, M. Hardy, C.-B. Chien, R. T. Whitaker and W. Denk, “Axon Tracking in Serial Block-Free Scanning Electron Microscopy,” in Proceedings of MICCAI Workshop on Microscopic Image Analysis with Applications in Biology, pp. 114-119, 2006.

25. S. P. Awate, E. V. R. DiBella, T. Tasdizen and R. T. Whitaker, "Model-Based Image Reconstruction for Dynamic Cardiac Perfusion MRI from Sparse Data," in Proceedings of IEEE Engineering in Medicine and Biology Conference, pp. 936-941, 2006.
26. S. P. Awate, T. Tasdizen an R. T. Whitaker, "Unsupervised Texture Segmentation with Nonparametric Neighborhood Statistics," in Proceedings of the European Conference on Computer Vision (ECCV), 2006.
27. J. M. Kniss, R. Van Uitert, A. Stephens, G. Li, T. Tasdizen and C. Hansen, "Statistically Quantitative Volume Visualization," in Proceedings of IEEE Visualization, 2005.
28. T. Tasdizen, S. Awate, R. T. Whitaker and N. L. Foster, "MRI Tissue Classification with Neighborhood Statistics: A Nonparametric, Entropy-Minimizing Approach," 8th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), Lecture Notes in Computer Science LNCS 3749, Vol. 2 pp. 517–525, 2005.
29. T. Tasdizen, R. T. Whitaker, R. Marc and B. W. Jones, "Enhancement of Cell Boundaries in Transmission Microscopy Images," Proceedings of International Conference on Image Processing (ICIP), Vol. 2, pp. 129–132, 2005.
30. L. Grady and T. Tasdizen, "A Geometric Multigrid Approach to Solving the 2D Inhomogeneous Laplace Equation with Internal Dirichlet Boundary Conditions," Proceedings of International Conference on Image Processing (ICIP), Vol. 2, pp. 642–645, 2005.
31. G. Kindlmann, A. L. Alexander, M. Lazar, J. Lee, T. Tasdizen and R. T. Whitaker, "An Algorithm for Moment-Based Global Registration of Echo Planar Diffusion-Weighted Images," in Proceedings of 12th Annual ISMRM, pp. 2200, 2004.
32. T. Tasdizen and R. T. Whitaker, "Anisotropic diffusion of surface normals for feature preserving surface reconstruction", in Proceedings of 4th International Conference on 3-D Digital Imaging and Modeling, pp. 353–360, 2003.
33. T. Tasdizen and R. T. Whitaker, "Cramer-Rao Bounds for Nonparametric Surface Reconstruction from Range Data", in Proceedings of 4th International Conference on 3-D Digital Imaging and Modeling, pp. 70–77, 2003.
34. T. Tasdizen and R. T. Whitaker, "Feature preserving variational smoothing of terrain data", 2nd International IEEE Workshop on Variational, Geometric and Level Set Methods in Computer Vision, 2003.
35. G. Kindlmann, R. T. Whitaker, T. Tasdizen, and T. Moller, "Curvature-Based Transfer Functions for Direct Volume Rendering: Methods and Applications", in Proceedings of IEEE Visualization, pp. 513–520, 2003.
36. S. Premoze, T. Tasdizen, J. Bigler, A. Lefohn and R. T. Whitaker, "Particle-Based Simulation of Fluids", in Proceedings of Eurographics, pp. 401–410, 2003.
37. M. Barzohar, L. Preminger, T. Tasdizen and D. B. Cooper, "Robust Method for Completely Automatic Aerial Detection of Occluded Roads with New Initialization," Proceedings of SPIE – Volume 4820, Infrared Technology and Applications XXVIII, Bjorn Andresen, Gabor F. Fulop, Marija Strojnik, Editors, pp. 688-698, 2003.
38. T. Tasdizen, R. T. Whitaker, P. Burchard and S. Osher, "Geometric Surface Smoothing via Anisotropic Diffusion of Normals", in Proceedings of IEEE Visualization, pp. 125–132, 2002.
39. T. Tasdizen and D. B. Cooper, "Boundary Estimation from Intensity/Color Images with Algebraic Curve Models", in Proceedings of 15th IEEE Computer Society International Conference on Pattern Recognition (ICPR), Vol 1, pp. 225–228, 2000. **Best Student Paper Award Honorable Mention**.

40. T. Tasdizen, J.-P. Tarel and D. B. Cooper, “Algebraic Curves that Work Better”, in Proceedings of IEEE Computer Society Conf. on Computer Vision and Pattern Recognition (CVPR), Vol 2, pp. 35–41, 1999.
41. Z. Lei, T. Tasdizen and D. B. Cooper, “PIMs and Invariant Parts for Shape Recognition”, in Proceedings of 6th IEEE Computer Society International Conference on Computer Vision, 1997.
42. L. Akarun, T. Tasdizen and C. Ersoy, “Genetik Algoritmalarla Renk Nicemlemesi”, SIU’97 Bildiriler kitabi, 1997.

- **Abstracts and Other Publications**

43. J. Anderson, B. W. Jones, D. Mastronarde, P. Koshevoy, C.B. Watt, J. Yang, T. Tasdizen, R. Whittaker, J. Spaltenstein, R.E. Marc, ”The Retinal Connectome: Networks in the Amacrine Cell Layer”, The Association for Research in Vision and Ophthalmology (ARVO), 2009.
44. E. Jurrus, T. Tasdizen, S. Watanabe, M. W. Davis, E. M. Jorgensen and R. T. Whitaker, ”Semi-Automated Reconstruction of the Neuromuscular Junctions in the C. elegans,” MICCAI Workshop on Microscopic Image Analysis with Applications in Biology, 2008.
45. N. L. Foster, A. Y. Wang, T. Tasdizen, K. Chen, W. Jagust, R. A. Koeppe, E. Reiman, M. W. Weiner and S. Minoshima, ” Cerebral Hypometabolism Suggesting Frototemporal Dementia in an Alzheimer’s Disease Clinical Trial, American Academy of Neurology, 2008.
46. T. Fletcher, A. Wang, T. Tasdizen, K. Chen, W. Jagust, R. Koeppe, E. Reiman, M. Weiner, S. Minoshima, N. Foster, ”Variability of Normal Cerebral Glucose Metabolism from the Alzheimer’s Disease Neuroimaging Initiative: Implications for Clinical Trials,” Annals of Neurology, Vol 62:11, 2007.
47. B. W. Jones, R. E. Marc, C. B. Watt, K. Kinardi, D. DeMill, J.H. Yang, T. Tasdizen, P. Koshevoy, E. Jurrus and R. T. Whitaker, “Structure and Function of Microneuromas in Retinal Remodeling,” The Association for Research in Vision and Ophthalmology (ARVO), 2007.
48. W.-K. Jeong, T. Tasdizen and R. T. Whitaker, “Feature Preserving Smoothing of Height Field Data using Multigrid Solver on GPU,” in proceedings ACM Workshop on General Purpose Computing on Graphics Processors, 2004.
49. J. Zhou, D. P. Lopresti and T. Tasdizen, “Finding Text in Color Images”, SPIE Document Recognition V, 1998.
50. Z. Lei, T. Tasdizen and D. B. Cooper, “Object Signature Curve and Invariant Shape Patches for Geometric Indexing into Pictorial Databases”, Multimedia Storage and Archiving Systems II, SPIE International Symposium and Education Program on Voice, Video, and Data Communications, 1997.