

# John Bogovic

*Electrical Engineer: Medical image analysis,  
Machine learning, Computer vision*

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## Education

- February 2013 **PhD Electrical Engineering**, *Johns Hopkins University*, Baltimore, MD,  
“Automatic Cerebellar Lobule Segmentation from Magnetic Resonance Images”.  
Advisor: Jerry L. Prince
- Spring 2008 **MS Electrical Engineering**, *Johns Hopkins University*, Baltimore, MD.
- Spring 2006 **BS Electrical Engineering**, *Washington University in St. Louis*, MO, *Magna Cum Laude*.  
Eta Kappa Nu, Tau Beta Pi

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## Experience

- Fall 2007 - present **Research Assistant**, *Johns Hopkins University*, Baltimore, MD.
- Designed advanced image segmentation algorithms (MGDM).
  - Advanced “statistical label fusion” methodology.
  - Managed ten undergraduate students in collecting training data from 90 MRIs.
  - Implemented a processing pipeline for diffusion-weighted MRI (CATNAP) that has been run on over 1000 subjects.
- Summer 2005, **CAD Drafter**, *Fiskaa Engineering*, New York, NY.
- Summer 2006
- Drafted and prepared engineering plans using AutoCAD for architects and contractors.
  - Met strict deadlines and worked as part of small teams in a fast-paced work environment.

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## Software Development Projects

- Fall 2011–present **Multiple-object Geometric Deformable Model**, [nitrc.org/projects/mgdm/](http://nitrc.org/projects/mgdm/).
- Developed MGDM: a stable, efficient framework for image segmentation.
  - Demonstrated MGDM's unique capabilities and superior performance.
  - Improved usability by creating JIST and MATLAB interfaces.
  - Enabled its application to whole brain, cerebellum, thalamus, tongue and cell segmentation problems.
- Fall 2010–present **MR Connectome Automated Pipeline (MRCAP)**, [www.nitrc.org/projects/mrcap](http://www.nitrc.org/projects/mrcap), (>100 downloads).
- MRCAP combines structural magnetic resonance data with diffusion tensor imaging to estimate the wiring diagram of the brain.
  - Led development of tractography and connectivity assesment algorithms.
- Fall 2009–present **Java Image Science Toolkit**, [nitrc.org/projects/jist](http://nitrc.org/projects/jist), (>7,500 downloads).
- JIST is an image processing framework with a user-friendly graphical interface.
  - Led development enabling interoperability with external cutting-edge image analysis software.
- Fall 2008–present **CATNAP**, [nitrc.org/plugins/mwiki/index.php/jist:CATNAP](http://nitrc.org/plugins/mwiki/index.php/jist:CATNAP).
- CATNAP provides processing and analysis tools for diffusion-weighted MRI.
  - Spearheaded implementation of CATNAP's algorithms in user-friendly JIST framework.
- Fall 2008–present **TOADS-CRUISE**, [nitrc.org/projects/toads-cruise](http://nitrc.org/projects/toads-cruise), (>15,000 downloads).
- The TOADS-CRUISE software consists of tools for segmenting and analyzing brain MRIs.
  - Designed a processing pipeline to automatically label cortical regions.

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## Awards, Honors and Fellowships

- 2010 **Student Travel Award**, *International Society for Magnetic Resonance in Medicine*.
- 2006 **Chertkof Endowed Fellowship**, *Johns Hopkins University*.
- 2006 **David Levy Award for Design Excellence**, *Washington University*.
- 2004 **Antoinette Frances Dames Award**, *Washington University*.

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## Skills

**Programming:** Java, Matlab  
**Scripting:** Bash, Python

**Productivity:** VTK,  $\LaTeX$ , Photoshop, Illustrator, Visualization  
**Methods:** Statistical analysis, Machine learning

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## Teaching and Mentoring

### Teaching Assistant

Spring 2011 “*Medical Image Analysis*” under Prof. Jerry L. Prince

Fall 2007 “*Feedback Control in Biological Signaling Pathways*” under Prof. Pablo Iglesias

### Undergraduate Research Mentor

Summer 2010–2012 **Shape Analysis of Cerebellar Lobules**, *Caleb Fan*.

Fall 2009–2011 **Manual Parcellation of the Thalamic Nuclei**, *James Barger*.

Summer 2008 **Thalamus Parcellation Machine**, *Jade Velasquez*.

### Delineation of Cerebellar Lobules

2007–2010 L. Atlan, A. Kumordzie, R. Rigg, C. Ang, J. Jabbari, E. Dana, S. Wang, W. Mayes, A. Zhao, K. Hwang

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## Publications

\* denotes presenter, where relevant.

2013

- **J.A. Bogovic**, P-L Bazin, S.H. Ying, J.L. Prince, “Automated Segmentation of the Cerebellar Lobules using Boundary Specific Classification and Evolution.” in Proc. IPMI (to appear).
- **J.A. Bogovic**, J.L. Prince, P-L Bazin, “A Multiple Object Geometric Deformable Model for Image Segmentation.” CVIU 117(3), 145-57. 2013.
- **J.A. Bogovic**, B. Jedynek, R. Rigg, A. Du, B.A. Landman, J.L. Prince, S.H. Ying, “Approaching Expert Results Using a Hierarchical Cerebellum Parcellation Protocol for Multiple Inexpert Human Raters.” Neuroimage 64(1), 616-29, 2013.
- C. Ye, **J.A. Bogovic**, S.H. Ying, J.L. Prince, “Parcellation of the Thalamus Using Diffusion Tensor Images and a Multi-object Geometric Deformable Model.” Proc. SPIE-MI 2013, Orlando, FL, February 9-14, 2013.
- Z. Yang, **J.A. Bogovic**, A. Carass, M. Ye, P.C. Searson, J.L. Prince. “Automatic Cell Segmentation in Fluorescence Images of Confluent Cell Monolayers Using Multi-object Geometric Deformable Model (MGDM).” Proc. SPIE-MI 2013, Orlando, FL, February 9-14, 2013.

2012

- B.A. Landman, **J.A. Bogovic**, A. Carass, M. Chen, S. Roy, N. Shiee, Z. Yang, B. Kishore, D. Pham, P-L Bazin, S. Resnick, J.L.Prince. “System for Integrated Neuroimaging Analysis and Processing of Structure.” Neuroinformatics (in Press)
- B.A. Landman, **J.A. Bogovic**, H. Wan, F.E.Z. ElShahaby, P-L Bazin, and J.L. Prince, “Resolution of Crossing Fibers with Constrained Compressed Sensing using Diffusion Tensor MRI.” Neuroimage 59(3), 2175-86. 2012.
- W.R. Gray, **J.A. Bogovic**, J.T. Vogelstein, B.A. Landman, J.L. Prince, R.J. Vogelstein, “Magnetic Resonance Connectome Automated Pipeline.” IEEE Pulse 3(2), 2012.
- C. Ye, **J.A. Bogovic**, P-L Bazin, J.L. Prince, S.H. Ying, “Fully Automatic Segmentation of the dentate nucleus using diffusion weighted images.” Proc. ISBI, Barcelona, Spain, May 2012.
- C. Ye, P-L Bazin, **J.A. Bogovic**, S.H. Ying, J.L. Prince, “Labeling of the Cerebellar Peduncles Using a Supervised Gaussian Classifier with Volumetric Tract Segmentation.” Proc. SPIE-MI, San Diego, CA, February 2012.
- B.A. Landman, A.J. Asman, A.G. Scoggins, **J.A. Bogovic**, F. Xing, J.L. Prince, “Robust statistical fusion of image labels,” IEEE TMI 31(2), 512-22, 2012.
- B.A. Landman, A.J. Asman, A.G. Scoggins, **J.A. Bogovic**, J.A. Stein, J.L. Prince, “Foibles, follies, and fusion: Web-based collaboration for medical image labeling.” Neuroimage 59(1), 530-9, 2012.

2011

- **J.A. Bogovic**, P-L. Bazin\*, J.L. Prince, and S.H. Ying, "Toward an Automatic Cerebellar Parcellation Method Robust to Anatomical Variation." OHBM, Quebec City, Canada, June 2011.
- Vogelstein JT, Gray W, Vogelstein RJ, **J.A. Bogovic**, Resnick S, Prince J, Priebe CE. "Connectome Classification: Statistical Graph Theoretic Methods for Analysis of MR-Connectome Data." OHBM, Quebec City, Canada, June 2011.
- Gray WR, **J.A. Bogovic**, Vogelstein JT, Ye C, Landman BA, Prince JL, Vogelstein RJ. "Magnetic resonance connectome automated pipeline and repeatability analysis." Society for Neuroscience, 2011.
- P-L Bazin, C. Ye, **J.A. Bogovic**, N. Shiee, D.S. Reich, J.L. Prince, D.L. Pham, "Direct segmentation of the major white matter tracts in diffusion tensor images." Neuroimage 58(2), 458-68, 2011.
- M. Chen, **J.A. Bogovic**, P.L. Bazin, J.L. Prince, "Distance Transforms in Multi Channel MR Image Registration." Proc. SPIE-MI, Orlando, FL, February, 2011.
- B.A. Landman, A.J. Huang, A. Gifford, D.S. Vikram, I.A. Lim, J.A. Farrell, **J.A. Bogovic**, J. Hua, M. Chen, S. Jarso, S.A. Smith, S. Joel, S. Mori, J.J. Pekar, P.B. Barker, J.L. Prince, P.C. van Zijl, "Multi-parametric neuroimaging reproducibility: a 3-T resource study." Neuroimage 54(4), 2854-66, 2011.

2010

- **J.A. Bogovic\***, P.L. Bazin, J.L. Prince. "Topology-preserving STAPLE." Proc. MMBIA, San Francisco, CA, June 2010. (Oral Presentation)
- **J.A. Bogovic**, B.A. Landman, P.L. Bazin, J.L. Prince. "Statistical Recombination of Rater Labels on Surfaces" Proc. SPIE-MI, San Diego, CA, February 2010.
- **J.A. Bogovic\***, M. Chen, A. Carass, P-L Bazin, D.L. Pham, S. Resnick, J.L. Prince, and B.A. Landman, "Multi-Modal Structural Networks: Mapping of Connectivity through Diffusion, Functional, and Structural Assessment of Intervening Pathways." ISMRM, Stockholm, Sweden, May 2010. (Oral Presentation)
- **J.A. Bogovic**, J.A. Barger, M. Thomson, X. Fan, J.L. Prince, and S.H. Ying, "Shape Variation of the Thalamic Nuclei Estimated from a Manual Parcellation." OHBM, Barcelona, Spain, June 2010.
- B.C Lucas, **J.A. Bogovic**, A. Carass, P-L Bazin, J.L. Prince, D.L. Pham, B.A. Landman "The Java Image Science Toolkit (JIST) for Rapid Prototyping and Publishing of Neuroimaging Software." Neuroinformatics 8(1), 19, 2010.
- X. Fan, **J.A. Bogovic**, P-L. Bazin, and J.L. Prince, "A novel contrast for DTI visualization for thalamus delineation." Proceedings of SPIE Medical Imaging (SPIE-MI 2010), San Diego, CA, February 2010.
- J. Vogelstein, **J.A. Bogovic**, A. Carass, W. Gray, J.L. Prince, B.A. Landman, D.L. Pham, L. Ferrucci, S. Resnick, C. Priebe, and R.J. Vogelstein, "Graph-Theoretical Methods for Statistical Inference on MR Connectome Data." OHBM, Barcelona, Spain, June 2010.
- B.A. Landman, **J.A. Bogovic**, J.L. Prince, "Simultaneous Truth and Performance Level Estimation with Incomplete, Over-complete, and Ancillary Data." Proc. SPIE-MI, San Diego, CA, February, 2010.
- B.A. Landman, H. Wan, **J.A. Bogovic**, P-L Bazin, J.L. Prince, "Resolution of Crossing Fibers with Constrained Compressed Sensing using Traditional Diffusion Tensor MRI." Proc. SPIE-MI, San Diego, CA, February, 2010.
- N. Shiee, P-L. Bazin, **J.A. Bogovic**, M. Chen, P.A. Calabresi, D.S. Reich, J.L. Prince, D.L. Pham, "Cortical thinning in Multiple Sclerosis." OHBM, Barcelona, Spain, June 2010.
- C. Zhao, D. Chen, A. Carass, M. Chen, **J.A. Bogovic**, J.L. Prince, "A Java Application for Manually Editing Cortical Labels." OHBM, Barcelona, Spain, June 2010.
- C. Zhao, A. Carass, M. Chen, **J.A. Bogovic**, D. Chen, J.L. Prince, "A Protocol for Manual Correction of Gyral Based Cortical Labels." OHBM, Barcelona, Spain, June 2010.
- Gray WR, Vogelstein JT, **J.A. Bogovic**, Carass A, Prince JL, Landman B, Pham D, Ferrucci L, Resnick SM, Priebe CE, Vogelstein RJ. "Graph-Theoretical Methods for Statistical Inference on MR Connectome Data." DARPA Neural Engineering, Science and Technology Forum, 2010.

2009

- **J.A. Bogovic**, R. Nicoletto, B.A. Landman, J.L. Prince, S.H. Ying, "Probabilistic Atlas of Cerebellar Degeneration Reflects Volume and Shape Changes." OHBM, San Francisco, California, June 2009.
- J. Wan, A. Carass, **J.A. Bogovic\***, R. Nicoletto, J.L. Prince, "Automated Cerebellum Extraction From Whole Head 3D MR Images." OHBM, San Francisco, California, June 2009.
- B.A. Landman, B. Lucas, **J.A. Bogovic**, A. Carass, J.L. Prince "A Rapid Prototyping Environment for NeuroImaging in Java." OHBM, San Francisco, California, June 2009.
- P-L Bazin, **J.A. Bogovic**, D.S. Reich, J.L. Prince, D.L. Pham, "Efficient MRF Segmentation of DTI White Matter Tracts using an Overlapping Fiber Model." Proc. MICCAI workshop of Diffusion Modeling and the Fiber Cup, 2009.
- P-L Bazin, **J.A. Bogovic**, D.S. Reich, J.L. Prince, D.L. Pham, "Belief Propagation Based Segmentation of White Matter Tracts in DTI." Proc. MICCAI, 2009.

2008

- **J.A. Bogovic**, A. Carass, J. Wan\*, B. A. Landman, and J. L. Prince, "Automatically identifying white matter tracts using cortical labels." Proc. ISBI, Paris, France, May 2008.
- **J.A. Bogovic**, A. Carass, J. Wan\*, B.A. Landman, J.L. Prince, "DTI Fiber Tractography Reveals Precentral-Postcentral Gyral Connectivity." OHBM, Melbourne, Australia, June 2008.
- X. Fan, P.L. Bazin, **J.A. Bogovic**, Y. Bai, and J.L. Prince, "A Multiple Deformable Model Framework for Homeomorphic 3D Medical Image Segmentation." Proc. MMBIA, Anchorage, Alaska, June 2008.
- B. Landman, **J.A. Bogovic**, J. Prince, "Compressed sensing of multiple intra-voxel orientations with traditional DTI." Proc. MICCAI workshop on Computational Diffusion MRI, New York. 2008.