Leo J. Grady

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Education

- **Boston University** — Boston, MA
  Ph.D., Cognitive and Neural Systems (Dr. Eric Schwartz, advisor) — *1999–2003*
  - Dissertation: "Space-Variant Machine Vision — A Graph Theoretic Approach"
- **University of Vermont** — Burlington, VT
  B.Sc., Electrical Engineering (Computer Engineering Focus) — *1995–1999*
  - Minors in applied mathematics and physics

Work Experience

- **Siemens Corporate Research** — Princeton, NJ
  Line Manager — *Jan. 2010 – Present*
  Principal Research Scientist — *April 2010 – Present*
  Senior Research Scientist — *Sept. 2003 – April 2010 (senior since April 2008)*
  - As a (Senior) Research Scientist: Researched, developed, patented, published and gave talks on image analysis, clustering and data analytics.
  - As a (Senior) Research Scientist: Designed and implemented software for the analysis of images. Most applications of this software were in the area of biomedical image analysis. This software is currently employed in approximately 15 different Siemens (and Siemens partner) products.
  - As a Senior (Principal) Research Scientist: Wrote proposals, acquired projects and supervised junior research scientists, students and interns to meet software deliveries for the projects, as well as to advance research goals.
  - As a Principal Research Scientist: Helped set strategic directions for technology development, hiring and acquisition. Represented Siemens Corporate Research internally and externally by making presentations and forging academic, clinical and industrial collaborations. Performed troubleshooting in crisis projects. Lead projects and supervised junior scientists. Performed research and development in areas of disruptive technologies.
  - As a Line Manager: Provided line management to a group of 20 people, including research scientists and software engineers. The role of a line manager is to set targets, resolve employee conflicts, structure the development of soft and technical skills in the group, conduct yearly/mid-year employee performance reviews and interview prospective hires.
- **Boston University** — Boston, MA
  Research and Training Fellow — *Sept. 1999 – Aug. 2003*
  - Developed computer vision techniques using techniques from graph theory which could be applied to images defined on arbitrary sampling structures and topologies.
  - Served as a teaching assistant for a class on introductory linear algebra, differential equations and signal processing. Received the Boston University Teaching Assistant Award for Excellence in 2001.

Research Interests

- **Computer Vision and Image Processing**
  - Image segmentation and grouping
  - Object recognition
  - Machine learning
  - Alpha-matting
  - Compressed sensing
  - Denoising
  - Inpainting
- **Biomedical Imaging**
  - Quantitative imaging
  - Interactive image analysis
  - Segmentation of anatomical structures with prior information
  - Diagnostics
  - Imaging biomarkers
  - Image reconstruction from sparse samples
  - Shape characterization
  - Surface analytics and processing
  - Computational modeling
- **Discrete Mathematics**
  - Graph theory
  - Combinatorial optimization
  - Complex networks
  - Scientific computing
  - Computational linear algebra
  - Numerical analysis
  - Data mining
  - Discrete calculus

Professional activities

Associations: Member of IEEE, the MICCAI society and Tau Beta Pi (engineering honors fraternity).

Area Chair: Area chair for MICCAI 2012 and CVPR 2013.

Committees: Program committee member for the conferences: Medical Image Computing and Computer Assisted Intervention (MICCAI), Computer Vision and Pattern Recognition (CVPR), European Conference on Computer Vision (ECCV), International Conference on Distributed Smart Cameras. Program committee member for the workshops: Interactive Computer Vision, Perceptual Organization for Computer Vision, Structured Models in Computer Vision, Information Theory in Computer Vision and Pattern Recognition.

Review:

Journals: IEEE Trans. on Pattern Analysis and Machine Intelligence, IEEE Trans. on Medical Imaging, IEEE Trans. on Biomedical Engineering, IEEE Trans. on Image Processing, IEEE Trans. on Neural Networks, International Journal of Computer Vision, Medical Image Analysis, Computer Vision and Image Understanding, Computers and Graphics, IEEE Signal Processing Letters, IEEE Signal Processing Magazine, Journal of Computer Science and Technology, Medical and Biological Engineering and Computing, SIAM J. of Imaging Sciences, Pattern Recognition, Journal of Mathematical Imaging and Vision.

Conferences: SIGGRAPH, MICCAI, CVPR, ECCV, ICCV, ISCV.

Awards: Boston University Teaching Assistant Award for Excellence in 2001, CVPR 2007 Outstanding Reviewer Award, ICCV 2009 Outstanding Reviewer Award, ECCV 2010 Outstanding Reviewer Award, finalist for Best Student Paper Award at ISBI 2011, Best Student Paper Award at SPIE 2012.

Tutorials:

CVPR 2007: *Fundamentals linking discrete and continuous approaches to computer vision - A topological view.* The course page is at `http://www.cns.bu.edu/~lgrady/Short_Course.html` and slides (from a similar, abbreviated coarse) are available at: `https://www.ipam.ucla.edu/publications/gc2008/gc2008_7718.zip`.

ECCV 2008: *Combinatorial Calculus in Computer Vision: Formulating and Solving Continuous PDEs on Graphs.* The course page is at `http://cns.bu.edu/~lgrady/Short_Course_ECCV08.html` and slides are available at: `http://cns.bu.edu/~lgrady/ECCV08_tutorial_grady_bougleux.zip`.

Invited talks:

- Technical University of Munich, Department of Computer Aided Medical Procedures and Augmented Reality, March 2012.
- New York University/Courant Institute of Mathematical Sciences, Department of Computer Science, Feb. 2012.
- University of Pennsylvania, Department of Computer Science, Dec. 2011.
- Rutgers University, Department of Computer Science, Dec. 2011.
- University of Pennsylvania, Department of Radiology, Nov. 2011.
- Banff International Research Station, Workshop on Geometry for Anatomy, Aug. 2011.
- Keynote speaker at the International Symposium on Mathematical Morphology, July 2011.
- Cornell University, Department of Computer Science, June 2011.
- University of Toronto, Fields Institute, June 2011.
- University of Twente, Institute for Biomedical Technology and Technical Medicine, Jan. 2011.
- University of Wisconsin, Department of Computer Science, Dec. 2010.
- Keynote speaker at the International Conference on Image and Signal Processing, June 2010.
- Université Paris 13, Département de Mathématiques, May 2010.
- Mitsubishi Electric Research Lab (MERL), July 20th, 2009.

- Workshop on Histology Image Analysis (talk and panel discussion), Ohio State University, July 6th, 2009.
- SPIE Photonics West '09: Multimodal Biomedical Imaging, International Symposium on Biomedical Optics, Jan. 24th, 2009.
- Drexel University, Department of Computer Science, Jan. 12th, 2009.
- MIT/MGH, Martinos Center for Biomedical Imaging, Dec. 3rd, 2008.
- Université Paris-Est, ESIEE, Oct. 17th, 2008.
- Microsoft Research, Cambridge UK, Oct. 11th, 2008.
- Imperial College of London and GlaxoSmithKline, Clinical Imaging Center, Oct. 9, 2008.
- University College London, Department of Computer Science, Oct. 8th, 2008.
- Université de Caen Basse-Normandie, GREYC Lab, Oct. 6th, 2008.
- Boston University, Department of Computer Science, Aug. 13th, 2008.
- University of California Los Angeles, Institute for Pure and Applied Mathematics, in conjunction with the "Graph Cuts and Related Discrete or Continuous Optimization Problems" program, Feb. 25th, 2008.
- University of Maryland, Norbert Weiner Center for Harmonic Analysis and Applications, in conjunction with the "February Fourier Talks", Feb. 21st, 2008.
- Johns Hopkins University, Center for Imaging Science, Oct. 2nd, 2007.
- Keynote speaker at the "6th IAPR-TC-15 Workshop on Graph-based Representations in Pattern Recognition", Universidad de Alicante, June 12th, 2007
- University of Minnesota, Institute for Mathematics and Applications, Feb. 22nd, 2006
- Université Paris Dauphine, in conjunction with "Mathematics and Image Analysis 2006", Sept. 19th, 2006
- Stevens Institute of Technology, Department of Computer Science, Mar. 28th, 2005
- University of Utah, Scientific Computing and Imaging Institute, Jan. 14th, 2005

Student supervision

- **PhD: As thesis committee member**
  - Sara Saperstein, Boston University (advisor: Jason Bohland). Expected graduation in 2014.
  - Herve Lombaert, École Polytechnique, Montreal (advisor: Farida Cheriet). Expected graduation in 2012. Supervised internship at Siemens Corporate Research in 2010.
  - Daniel Weller, MIT (advisor: Vivek Goyal). Graduated in Jan. 2012. This collaboration also included Prof. Elfar Adalsteinsson (MIT) and Lawrence Wald (MGH).
  - Camille Couprie, ESIEE, Paris (co-advisors: Hugues Talbot and Laurent Najman). Graduated in October, 2011. Supervised internship at Siemens Corporate Research in 2008.

- **PhD: As thesis examiner**
  - Ahmed Besbes, Ecole Centrale de Paris (advisor: Nikos Paragios). "Image Segmentation using MRFs and Statistical Shape Modeling", Sept. 2010.

Grant support

Grants are not the primary source of funding at Siemens Corporate Research. Additionally, as a large corporation (and especially a foreign corporation), we are ineligible to apply for many grants. However, I have been supported by several grants:

NIH R01 HL094557-01A2 Improved Cardiac and Vascular Magnetic Resonance Imaging Using a Combination of Parallel Imaging and Compressed Sensing Concepts. Jan. 2010 – Jan. 2015

Total award: $3,490,481.00 Role: Co-Investigator, funded at 2.5% of the total award.

PI: Mark Griswold, Case Western Reserve University

The objective of this proposal is to produce a new level of gains in imaging speed and SNR for cardiac and vascular imaging by combining novel concepts of non-Cartesian parallel imaging techniques with the newly emerging compressed sampling theory. Compressed sensing promises to revolutionize the field of MRI by breaking the traditional link between imaging time and SNR. Here we will exploit these concepts to develop a set of completely new imaging strategies with dramatic increases in SNR and imaging speed. We specifically address computational limitations by developing an open source software distribution for high-end graphical processing units. These processors promise to dramatically reduce computational time across the board in medical imaging. Ultimately we believe that these technologies, when viewed as a whole, will result in a novel class of methods for cardiac and vascular diagnosis which will provide an increase in image quality, SNR and speed in MRI, perhaps unparalleled in the evolution of MRI, resulting in dramatically improved imaging of MR angiography, cardiac function and cardiac perfusion.

Security Screening Segmentation Challenge (ALERT). March 2011 – Dec. 2011

Total award: $70,000.00 Role: Principal Investigator, funded at 100% of the total award.

PI: Leo Grady, Siemens Corporate Research

There is a need to improve the performance of equipment used to detect objects of interest in items brought onto airplanes, particularly equipment which uses volumetric Computed Tomography (CT) to detect explosives in checked and carry-on baggage. Currently, volumetric CT scanners use automated target recognition (ATR) algorithms to identify objects of interest in the images that result from the volumetric CT scanning, and may or may not contain a step known as segmentation that identifies the voxels corresponding to potential objects of interest in the images as well as features about the potential objects of interest such as mass, density and volume. The accuracy of the segmentation step may be degraded by artifacts in CT images, including streaks, blooming, blurring and low frequency artifacts which are caused by the finite resolution of the scanner, sampling, beam hardening, scatter, limited dynamic range of the scanner and other sources. The performance of object of interest detection can be improved if the accuracy of the outputs of segmentation is improved. In cooperation with the Explosives Division of the Science and Technology Directorate of the Department of Homeland security we have participated in a challenge to perform completely automatic image segmentation on a sizeable set of volumetric CT images of real luggage.

NIH R01-CA-134493-01A1 A Platform for Cancer Biomarker Validation: Image Fusion using NIR Fluorescence. Jan. 2009 – Jan. 2014.

Total award: $745,852.00 Role: Co-Investigator, funded at 14% of the total award.

PI: John Frangioni, BIDMC

This is an academic-industrial collaboration aimed at developing NIR fluorescence-based technology that permits microscopic features of a tumor to be co-registered in 3D with macroscopic imaging studies, such as MRI and CT.

DARPA HR0011-08-3-0004 Deep Bleeder Acoustic Coagulation (DBAC) — Phase II. Aug. 2008 – Aug. 2010.

Total award: $11,256,966.00 Role: Technical Contributor, funded at 0.1% of the total award.

PI: Michael Sekins, Siemens Ultrasound

The DBAC program seeks to address the problem of life and limb threatening hemorrhage from penetrating combat wounds in soldiers. The design objective for the DBAC cuff system is to stop and control bleeding in wounded limbs, for both fast and slow bleeders, such that the onset of irreversible hemorrhagic shock is prevented. Hemorrhage from limb wounds is a dominant cause of morbidity and mortality in combat, and thus continues to be among the most severe problems for military operations.

The DBAC BAA requires autonomous detection and localization (targeting) of a bleeding vessel, as well as successful execution of acoustic hemostasis (focused ultrasound to affect deep cautery). The requirements are even more challenging in that the DBAC system must: (1) be extremely light-weight, (2) treat in minimal time, and (3) be successfully used by minimally-trained operators.

In addition to this grant support, I served on a grant board for an NSF computer vision panel in 2008.

Software projects and products

- **Cardiac and vascular**
  - Automatic calculation of Proximal Isovelocity Surface Area (PISA) via analysis of Doppler and B-mode ultrasound
  - Automatic left ventricle segmentation in CT and MRI for calculation of ejection fraction and determination of heart efficiency.
  - Automatic determination of the standard cardiac views for display from CT images to improve the efficiency of the radiologist workflow.
  - Automatic four-chamber segmentation in CT images. Various diagnostic quantities can be determined from this calculation which open the door for further clinical research.
  - Automatic aorta segmentation in CT images, which is used as a preliminary step for coronary artery segmentation.
  - Automatic heart isolation in CT to improve coronary artery visualization on the heart surface.
  - Left atrium segmentation in CT for EP planning (atrial defibrillation).
  - Simulated CathLab visualization from CT images by suppressing the intensity of all non-coronary voxels.
  - Automatic myocardial wall thickness measurement of the left ventricle in CT data to provide guidance duration ablation procedures.
  - Interactive measurement of abdominal aortic aneurysms and thrombus for monitoring and treatment planning.

  - Automatic detection and localization of bleeding in the images obtained from a novel ultrasound device. This project (supported by DARPA) allowed us to build a device that can be used by a soldier with no medical background to cauterize bleeding in the extremities at the location of injury (e.g., in battlefield conditions). For press on this project, see: `http://www.sonoworld.com/Client/ModuleContent/ModuleContent.aspx?ContentId=1901`.

- **Oncology**
  - Interactive 2D and 3D tumor segmentation method for monitoring tumor volume in CT, MRI, diffuse optical tomography and ultrasound.
  - Developed interactive organ segmentation system for radiation therapy planning in CT and MRI images.
  - Developed a prostate segmentation module in MRI.
  - Interactive lymph node segmentation in MRI images for measurement and surgery planning.
  - Automatic liver and kidney segmentation in CT images for calculating tumor burden of these organs.

- **Skeletal**
  - Developed system to isolate and visualize the fetal skeleton in ultrasound images to provide an early warning of improper fetal development.
  - Developed a system for automatic and interactive segmentation of bone fragments in fracture cases for replacement and surgery planning.
  - Developed an interactive system for segmenting sinus cavities that was used to calculate the percentage of fluid fill.
  - Assisted development of rib unfolding visualization from CT acquisitions.

- ***In Vitro* Diagnostics**
  - Developed a system to predict Gleason score (cancer staging) from H&E stained prostate slices, obtained from a digital pathology system.
  - Developed a system to find and measure diagnostic pads for chemical urinalysis.
  - Developed a system to detect and classify virally infected cells.
  - Assisted development of a system for determining whether an H&E stained breast biopsy was malignant or benign. For press on this project, see:
    `http://www.siemens.com/innovation/pool/en/publikationen/publications_pof/pof_fall_2011/machine_learning/pof0211_ml_medizin_en.pdf`

- **Neural**
  - Using MRI and resting state fMRI, built a system which used network analytics to quantitatively assess if children have ADHD.
  - Built a system to quickly and accurately find point correspondence between cortical surfaces.

- **Compressed Sensing**
  - Developed a system for MRI image reconstruction from incomplete (sparse) samples acquired in k-space.

- **Security**
  - Developed a system that performed segmentation of the items inside luggage that was scanned using a CT machine.

- **Research code online**
  - Designed, implemented and documented the Graph Analysis Toolbox for MATLAB, available freely (along with a complete demo package) at `http://cns.bu.edu/~lgrady/software.html`. The purpose of the software is to allow for the manipulation and analysis of data associated with graphs (e.g., images). The toolbox has been downloaded over ten thousand times since being made available online in 2003.
  - I have made research code from several papers available online.

Publications

Bibliometrics — Approx. total citations: 1,600, h-index: 17, i10-index: 30 (Google Scholar)
Book:

1. Leo Grady and Jonathan R. Polimeni, "Discrete Calculus: Applied Analysis on Graphs for Computational Science", 2010, Springer. `http://www.amazon.com/Discrete-Calculus-Applied-Analysis-Computational/dp/1849962898`
2. Olivier Lezoray and Leo Grady, "Image Processing and Analysis with Graphs: Theory and Practice", CRC Press. Release date: July 3rd, 2012. `http://www.amazon.com/Image-Processing-Analysis-Graphs-Practice/dp/1439855072/`

Journal:

1. Herve Lombaert, Leo Grady, Jonathan R. Polimeni and Farida Cheriet, "FOCUSR: Feature Oriented Correspondence using Spectral Regularization — A Method for Precise Surface Matching", Under review with IEEE Trans. on Pattern Recognition and Machine Intelligence.
2. Noha El-Zehiry and Leo Grady, "Fast Global Optimization of Discrete Elastica with Application to Image Segmentation and Inpainting", Under review with IEEE Trans. on Pattern Analysis and Machine Intelligence.
3. Noha El-Zehiry and Leo Grady, "Combinatorial Optimization of the Multiphase Mumford-Shah Functional", Under review with the International Journal of Computer Vision.
4. Daniel S. Weller, Jonathan R. Polimeni, Leo Grady, Lawrence L. Wald, Elfar Adalsteinsson and Vivek K. Goyal, "Denoising Sparse Images from GRAPPA using the Nullspace Method (DESIGN)", Accepted to Magnetic Resonance in Medicine.
5. Parmeshwar Khurd, Leo Grady, Rafiou Oketokoun, Hari Sundar, Tejas Gajera, Summer Gibbs-Strauss, John V. Frangioni and Ali Kamen, "Global Error Minimization in Image Mosaicing Using Graph Connectivity and its Applications in Microscopy", Accepted to the Journal of Pathology Informatics.
6. Camille Couprie, Leo Grady, Laurent Najman and Hugues Talbot, "Combinatorial Continuous Max Flow", SIAM J. on Imaging Sciences, Vol. 4, No. 3, pp. 905–930, 2011.
7. Kambiz Frounchi, Lionel C. Briand, Leo Grady, Yvan Labiche, Rajesh Subramanyan, "Automating Image Segmentation Verification and Validation by Learning Test Oracles", Information and Software Technology, Vol. 53, No. 12, pp. 1337–1348, Dec. 2011.
8. Camille Couprie, Leo Grady, Laurent Najman and Hugues Talbot, "Power Watersheds: A Unifying Graph Based Optimization Framework", IEEE Trans. on Pattern Analysis and Machine Intelligence, Vol. 33, No. 7, pp. 1384–1399, July 2011

9. Leo Grady, "Minimal Surfaces Extend Shortest Path Segmentation Methods to 3D", IEEE Trans. on Pattern Analysis and Machine Intelligence, Vol. 32, No. 2, pp. 321–334, Feb. 2010.

10. Leo Grady and Christopher Alvino, "The Piecewise Smooth Mumford-Shah Functional on an Arbitrary Graph", IEEE Trans. on Image Processing, Vol. 18, No. 11, pp. 2547–2561, Nov. 2009.

11. Leo Grady, "Random Walks for Image Segmentation", IEEE Trans. on Pattern Analysis and Machine Intelligence, Vol. 28, No. 11, pp. 1768–1783, Nov., 2006.

12. Leo Grady and Eric L. Schwartz, "Isoperimetric Partitioning: A new algorithm for graph partitioning", SIAM Journal on Scientific Computing, vol. 27, no. 6, pp. 1844–1866, June 2006.

13. Leo Grady and Eric L. Schwartz, "Isoperimetric Graph Partitioning for Image Segmentation", IEEE Trans. on Pattern Analysis and Machine Intelligence, vol. 28, no. 3, pp. 469–475, March 2006.

Invited Book Chapters:

1. Leo Grady, "Targeted Image Segmentation Using Graph Methods", in "Image Processing and Analysis with Graphs", ed. Olivier Lezoray and Leo Grady, CRC Press 2012.

2. Olivier Lezoray and Leo Grady, "Graph Theory Concepts and Definitions used in Image Processing", in "Image Processing and Analysis with Graphs", ed. Olivier Lezoray and Leo Grady, CRC Press 2012.

3. Dheeraj Singaraju, Leo Grady, Ali Kemal Sinop, René Vidal, "Continuous Valued MRFs for Image Segmentation", In "Markov Random Fields for Vision and Image Processing", pp. 127–142, ed. Andrew Blake, Pushmeet Kohli, Carsten Rother, MIT Press 2011.

4. Leo Grady, Yiyong Sun and James Williams, "Three Interactive Graph-Based Segmentation Methods Applied to Cardiovascular Imaging", In "Mathematical Models in Computer Vision: The Handbook", pp. 453–469, ed. Nikos Paragios, Yunmei Chen, Oliver Faugeras, Springer 2006.

Double Blind Refereed Conferences with Less than 30% Acceptance Rate (Full Papers):

1. Maxwell D. Collins, Jia Xu, Leo Grady, Vikas Singh, "Random Walks for Multi Image Cosegmentation: Quasiconvexity Results and GPU-based Solutions", Accepted to CVPR 2012.

2. Leo Grady, Marie-Pierre Jolly and Aaron Seitz, "Segmentation from a Box", Proc. of ICCV, pp. 367–374, 2011.

3. Leo Grady, Saurabh Datta, Oliver Kutter, Christophe Duong, Wolfgang Wein, Stephen H. Little, Stephen R. Igo, Shizhen Liu and Mani Vannan, "Regurgitation Quantification Using 3D PISA in Volume Echocardiography", Proc. of MICCAI, pp. 512–519, 2011

4. Herve Lombaert, Leo Grady, Jonathan R. Polimeni and Farida Cheriet, "Fast Brain Matching with Spectral Correspondence", Proc. of IPMI, pp. 660–673, 2011.

5. Noha El-Zehiry and Leo Grady, "Fast Global Optimization of Curvature", Proc. of CVPR, pp. 3257–3264, 2010.

6. Camille Couprie, Leo Grady, Laurent Najman and Hugues Talbot, "Power Watersheds: A New Image Segmentation Framework Extending Graph Cuts, Random Walker and Optimal Spanning Forest", Proc. of ICCV, pp. 731–738, 2009.

7. Marie-Pierre Jolly, Hui Xue, Leo Grady and Jens Guehring "Combining Registration and Minimum Surfaces for the Segmentation of the Left Ventricle in Cardiac Cine MR Images", Proc. of MICCAI, pp. 910–918, 2009.

8. Dheeraj Singaraju, Leo Grady and René Vidal, "P-Brush: Continuous Valued MRFs with Normed Pairwise Distributions for Image Segmentation", Proc. of CVPR, 2009.

9. Leo Grady and Christopher Alvino, "Reformulating and Optimizing the Mumford-Shah Functional on a Graph — A Faster, Lower Energy Solution", Proc. of ECCV, pp. 248–261, 2008.

10. Leo Grady, "A Lattice-Preserving Multigrid Method for Solving the Inhomogeneous Poisson Equations used in Image Analysis", Proc. of ECCV, pp. 252–264, 2008.

11. Leo Grady and Marie-Pierre Jolly, "Weights and Topology: A Study of the Effects of Graph Construction on 3D Image Segmentation", Proc. of MICCAI, vol. 1, pp. 153–161, 2008.

12. Dheeraj Singaraju, Leo Grady and René Vidal, "Interactive Image Segmentation Via Minimization of Quadratic Energies on Directed Graphs", Proc. of CVPR 2008, 2008.

13. Leo Grady and Ali Kemal Sinop, "Fast Approximate Random Walker Segmentation Using Eigenvector Precomputation", Proc. of CVPR, 2008.

14. Ali Kemal Sinop and Leo Grady, "A Seeded Image Segmentation Framework Unifying Graph Cuts and Random Walker Which Yields A New Algorithm", Proc. of ICCV, 2007.

15. Ali Kemal Sinop and Leo Grady, "Uninitialized, Globally Optimal, Graph-Based Rectilinear Shape Segmentation — The Opposing Metrics Method", Proc. of ICCV 2007, 2007.

16. Leo Grady, Gareth Funka-Lea, "An Energy Minimization Approach to the Data Driven Editing of Presegmented Images/Volumes", Proc. of MICCAI, vol. 2, pp. 888–895, 2006.

17. Ali Kemal Sinop, Leo Grady, "Accurate Banded Graph Cut Segmentation of Thin Structures Using Laplacian Pyramids", Proc. of MICCAI, vol. 2, pp. 896–903, 2006.

18. Leo Grady, "Computing Exact Discrete Minimal Surfaces: Extending and Solving the Shortest Path Problem in 3D with Application to Segmentation", Proc. of CVPR, vol. 1, pp. 69–78, 2006.

19. Leo Grady, "Fast, Quality, Segmentation of Large Volumes — Isoperimetric Distance Trees", Proc. of ECCV, vol. 3, pp. 449–462, 2006.

20. Daniel Cremers, Leo Grady, "Statistical Priors for Efficient Combinatorial Optimization via Graph Cuts", Proc. of ECCV, vol. 3, pp. 263–274, 2006.

21. Leo Grady, Thomas Schiwietz, Shmuel Aharon, Rudiger Westermann, "Random Walks for Interactive Organ Segmentation in Two and Three Dimensions: Implementation and Validation", Proc. of MICCAI, vol. 2, pp. 773–780, 2005.

22. Herve Lombaert, Yiyong Sun, Leo Grady, Chenyang Xu "A Multilevel Banded Graph Cuts Method for Fast Image Segmentation", Proc. of ICCV, Vol. 1, pp. 259–265, 2005.

23. Leo Grady, "Multilabel Random Walker Image Segmentation Using Prior Models", Proc. of CVPR, Vol. 1, pp. 763–770, 2005.

24. Leo Grady and Eric L. Schwartz. "Faster graph-theoretic image processing via small-world and quadtree topologies." Proc. of CVPR, pp. 360–365, 2004.

Other conferences, abstracts and technical reports:

1. Noha El-Zehiry and Leo Grady, "Vessel Segmentation using 3D Elastica Regularization", Accepted to ISBI 2012.

2. Daniel S. Weller, Jonathan R. Polimeni, Leo Grady, Lawrence L. Wald, Elfar Adalsteinsson and Vivek K. Goyal, "Greater Acceleration through Sparsity-Promoting GRAPPA Kernel Calibration", Accepted to ISMRM 2012.

3. Andrei Chekkoury, Parmeshwar Khurd, Jie Ni, Claus Bahlmann, Ali Kamen, Amar Patel, Leo Grady, Maneesh Singh, Martin Groher, Nassir Navab, Elizabeth Krupinski, Jeffrey Johnson, Anna Graham and Ronald Weinstein, "Automated Malignancy Detection in Breast Histopathological Images", Proc of SPIE 2012 (won Best Student Paper Award).

4. Noha El-Zehiry and Leo Grady, "Discrete Optimization of the Multiphase Piecewise Constant Mumford-Shah Functional", Proc. of EMMCVPR, pp. 233–246, 2011

5. Daniel S. Weller, Jonathan R. Polimeni, Leo Grady, Lawrence L. Wald, Elfar Adalsteinsson and Vivek K. Goyal, "Regularizing GRAPPA using Simultaneous Sparsity to Recover Denoised Images", Proc. SPIE Wavelets and Sparsity XIV, Vol. 8138, pp. 8138M-1-9, Aug. 2011.

6. Parmeshwar Khurd, Leo Grady, Kalpit Gajera, Mamadou Diallo, Peter Gall, Martin Requardt, Berthold Kiefer, Clifford Weiss and Ali Kamen, "Facilitating 3D Spectroscopic Imaging Through Automatic Prostate Localization in MR Images Using Random Walker Segmentation Initialized Via Boosted Classifiers", Proc. of Prostate Cancer Imaging, pp. 47–56, 2011.

7. Parmeshwar Khurd, Leo Grady, Ali Kamen, Summer Gibbs-Strauss, Elizabeth M. Genega and John V. Frangioni, "Network Cycle Features: Application to Computer-Aided Gleason Grading of Prostate Cancer Histopathological Images", Proc. of ISBI, pp. 1632–1636, 2011.

8. Daniel S. Weller, Jonathan R. Polimeni, Leo Grady, Lawrence L. Wald, Elfar Adalsteinsson and Vivek K. Goyal, "Evaluating Sparsity Penalty Functions for Combined Compressed Sensing and Parallel MRI", Proc. of ISBI 2011 (Finalist for best student paper).

9. Camille Couprie, Hugues Talbot, Jean-Christophe Pesquet, Laurent Najman and Leo Grady, "Dual Constrained TV-Based Regularization", Proc. of ICASSP 2011.

10. Daniel S. Weller, Jonathan R. Polimeni, Leo Grady, Lawrence L. Wald, Elfar Adalsteinsson and Vivek K. Goyal, "Combined Compressed Sensing and Parallel MRI Compared for Uniform and Random Cartesian Undersampling of K-Space", Proc. of ICASSP, pp. 553–556, 2011.

11. Weller, D. S., Polimeni, J. R., Grady, L., Wald, L. L., Adalsteinsson, E., and Goyal, V. K. "SpRING: Sparse Reconstruction of Images using the Nullspace method and GRAPPA", Proc. of ISMRM 2011.

12. Camille Couprie, Xavier Bresson, Laurent Najman, Hugues Talbot and Leo Grady, "Surface Reconstruction using Power Watershed", Proc. of ISMM 2011.

13. Sowmya Ramakrishnan, Christopher Alvino, Leo Grady and Atilla Kiraly, "Automatic Three-Dimensional Rib Centerline Extraction from CT Scans for Enhanced Visualization and Anatomical Context", Proc. of SPIE 2011.

14. Zihua Su, Xiang Deng, Christophe Chefd'hotel, Leo Grady, Jun Fei, Dong Zheng, Ning Chen and Xiaodong Xu, "Quantitative Evaluation of Six Graph Based Semi-Automatic Liver Tumor Segmentation Techniques Using Multiple Sets of Reference Segmentation", Proc. of SPIE 2011.

15. Camille Couprie, Leo Grady, Laurent Najman and Hugues Talbot, "Anisotropic Diffusion using Power Watersheds", Proc. of ICIP 2010.

16. Noha El-Zehiry and Leo Grady, "Optimization of Weighted Curvature for Image Segmentation", Preprint posted to arXiv. 2010

17. D. S. Weller, J. R. Polimeni, L. J. Grady, L. L. Wald, E. Adalsteinsson and V. K. Goyal, "Combining nonconvex compressed sensing and GRAPPA using the nullspace method", Proc. of ISMRM 2010.

18. Camille Couprie, Leo Grady, Laurent Najman and Hugues Talbot, "A New Image Segmentation Framework: Power Watersheds", Proc. of the International Symposium on Mathematical Morphology 2009, pp. 53-55.

19. Leo Grady, Jonathan R. Polimeni, "Nullspace Compressed Sensing for Accelerated Imaging", Proc. of ISMRM 2009.

20. Marie-Pierre Jolly and Leo Grady, "3D General Lesion Segmentation in CT", Proc. of ISBI, pp. 796–799, 2008.

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An additional 40 patents are currently under review with the US Patent Office.