

Curriculum Vitae

Maxime Descoteaux

Professional Address :
NMR Lab, Neurospin
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EDUCATION

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| CEA Saclay
02/2008–02/2010 | Post-Doctorate Fellow at Neurospin <ul style="list-style-type: none">– Research Topic : High Spatial, Angular and Temporal Resolution Diffusion MRI Sequence Design for Structural and Functional Study of the Diffusion Process in the Human Brain.– Advisor : Dr. Cyril Poupon & Prof. Denis Le Bihan |
| Nice University
01/2005–02/2008 | Ph.D. with highest honors <ul style="list-style-type: none">– Thesis Topic : High Angular Resolution Diffusion Imaging : from Local Estimation to Segmentation and Tractography– Advisor : Prof. Rachid Deriche, INRIA Sophia Antipolis - Méditerranée |
| McGill University
09/2002–06/2004 | M.Sc. in Computer Science <ul style="list-style-type: none">– Thesis : A Multi-Scale Geometric Flow for Segmenting Vasculature in MRI : Theory and Validation– Advisor : Prof. Kaleem Siddiqi. |
| McGill University
09/1999–05/2002 | B.Sc. joint honours in Mathematics and Computer Science. |

PROFESSIONAL EXPERIENCE

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| 07/2004–10/2004 | Research Assistant
<i>National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan.</i> |
| 09/2003–05/2004 | Teaching Assistant
Data Structures and Algorithms & Linear Programming Undergraduate Courses
<i>School of Computer Science, McGill University, Montréal, Canada.</i> |
| 09/2003–05/2004 | Teaching Assistant
Ordinary Differential Equations & Linear Algebra Undergraduate Courses
<i>Department of Mathematics, McGill University, Montréal, Canada.</i> |
| 05/2001–08/2001 | NSERC Summer Undergraduate Research Assistant.
<i>Center for Intelligent Machines, McGill University, Montréal, Canada.</i> |

HONORS, AWARDS AND GRANTS

01/2005–12/2007	NSERC Postgraduate Scholarship, \$63 000 Can.
09/2005–08/2007	FQRNT-INRIA Grant, \$20 000 Can.
04/2007	Top 25 student paper award at the 2007 International Symposium in Biomedical Imaging (ISBI'07), \$300 US.
09/2004–08/2005	Fonds France-Canada pour la Recherche (FFCR), \$10 000 Can.
09/2004–12/2007	McGill Major, McGill University, \$30 000 Can (declined) .
07/2004–09/2004	Summer Program in Japan, National Institute of Advanced Science and Technology, Tsukuba, Japan, \$10 000 Can.
09/2002–08/2004	FQRNT Masters Scholarship, McGill University, \$15 000 Can.
09/2002–08/2003	Information Technology Award, McGill University, \$15 000 (declined) Can.
05/2001–08/2001	NSERC Undergraduate Research Assistanship, McGill University, \$5 200 Can.
09/1999–04/2002	McGill University Entrance Scholarship, \$3 500 Can.
09/1999–04/2004	Principal's Student-Athlete Award, McGill University.

LANGUAGES

English (fluent), French (native), Spanish (advanced)

COMPUTER SKILLS

Programming languages	C, C++ and Java.
Operating Systems	UNIX, Linux, Mac OS X, Windows XP and NT.
Development Software & Toolkits	Matlab, Maple, VTK/ITK, Image Magick, OpenGL, MINC, BrainVISA/Anatomist, 3D Slicer, MedINRIA, Camino, Siemens SYNGO.

RESEARCH INTERESTS

Brain Imaging

- Diffusion Weighted Magnetic Resonance Imaging (DW-MRI) Acquisition & Processing
- Fiber Tractography and Segmentation from DW-MRI
- Functional Diffusion MRI (fdMRI)
- 3D Shape Analysis of Anatomical Structures - fiber bundles, grey nuclei, blood vessels and bone tissues

Computer Vision

- Image processing - Fourier and Spherical Harmonics Analysis
- Shape Analysis. - Geometric Flows - Variational and Level Set approaches
- Differential Geometry - Scale-Spaces and Invariance

INVITED TALKS

March 2008	French Conference on Magnetic Resonance in Medecine (GRAMM) 2008, Lyon, France. <i>Beyond Diffusion Tensor Imaging : Acquisition and Processing.</i>
August 2007	Summer School in Biomedical Engineering, Nanmburg, Germany. <i>Q-Ball Imaging : Analytical Reconstruction, Sharpening & Segmentation.</i>
September 2006	Mathematics in Image Analysis Conference, Université Dauphine, Paris, France. <i>Processing High Angular Resolution Diffusion Data to Recover Fiber Crossing.</i>
January 2006	Center for Intelligent Machines, McGill University, Canada. <i>Analytic ODF Estimation and Validation in Q-ball Imaging.</i>
August 2004	National Institute of Advanced Science and Technology, Tsukuba, Japan. <i>Shape Operators for Bone Detection, York University, Toronto, Canada.</i>
June 2004	Toronto-Montréal Computer Vision Workshop. <i>A Multi-Scale Geometric Flow for Segmenting Vasculature in MRI.</i>

2004–Present

Reviewer for International Journals

- Magnetic Resonance in Medicine, Wiley.
- NeuroImage, Elsevier.
- Journal of Magnetic Resonance Imaging, Wiley.
- Transactions on Medical Imaging, IEEE.
- Medical Image Analysis, Elsevier.
- Magnetic Resonance Materials in Physics, Biology and Medicine, Springer.
- Computer Methods and Programs in Biomedicine, Elsevier.
- Pattern Recognition, Elsevier.

Reviewer for International Conferences

- International Conference on Computer Vision (ICCV) 2007.
- Medical Imaging Computing and Computer-Assisted Intervention 2004-2007.
- Human Brain Mapping 2006-2007.
- European Conference on Computer Vision (ECCV) 2004.

PUBLICATIONS

Refereed International Journals

1. Maxime Descoteaux and Rachid Deriche. *High Angular Resolution Diffusion MRI Segmentation Using Region-Based Statistical Surface Evolution*. Journal of Mathematical Imaging in Vision, special issue on Mathematics in Image Analysis, in press 2008, doi :10.1007/s10851-008-0071-8
2. Maxime Descoteaux, Louis Collins and Kaleem Siddiqi. *A Multi-Scale Geometric Flow for Segmenting Vasculature in MRI : Theory and Validation*. Medical Image Analysis, in press 2008, doi :10.1016/j.media.2008.02.003
3. Peter Savadjiev, Jennifer S.W. Campbell, Maxime Descoteaux, Rachid Deriche, G. Bruce Pike and Kaleem Siddiqi. *Labeling of ambiguous sub-voxel fibre bundle configurations in high angular resolution diffusion MRI*. NeuroImage, in press 2008, doi :10.1016/j.neuroimage.2008.01.028
4. Demian Wassermann, Maxime Descoteaux, Rachid Deriche. *Diffusion Maps Clustering for Magnetic Resonance Q-Ball Imaging Segmentation*. International Journal on Biomedical Imaging, special issue on Recent Advances in NeuroImaging Methodology, Volume 2008, 2008.
5. Maxime Descoteaux, Elaine Angelino, Shaun Fitzgibbons, Rachid Deriche. *Regularized, Fast and Robust Analytical Q-Ball Imaging*, Magnetic Resonance in Medicine, Volume 58, Issue 3, Pages 497-510, 2007.
6. Maxime Descoteaux, Elaine Angelino, Shaun Fitzgibbons, Rachid Deriche. *Apparent Diffusion Coefficients from High Angular Resolution Diffusion Images : Estimation and Applications*. Magnetic Resonance in Medicine Volume 56, Issue 2, Pages 395-410, August 2006.
7. Maxime Descoteaux, Michel Audette, Kiyoyuki Chinzei, Kaleem Siddiqi. *Bone Enhancement Filtering : Application to Sinus Bone Segmentation and Simulation of Pituitary Gland Surgery*. Computer Aided Surgery Volume 11, Issue 5, Pages 247-255, September 2006.
8. Ingerid Reinertsen, Maxime Descoteaux, Kaleem Siddiqi, Louis Collins. *Validation of Vessel-Based Registration for Correction of Brain Shift*. Medical Image Analysis, Volume 11, Pages 374-388, 2007.
9. (*under review*) Maxime Descoteaux, Rachid Deriche, Thomas R. Knösche, Alfred Anwander. *Deterministic and Probabilistic Tractography Based on Complex Fiber Orientation Distributions* : Submitted to IEEE Transactions in Medical Imaging.

Refereed International Proceedings for Conferences

1. Julien Cohen-Adad, Maxime Descoteaux, Serge Rossignol, Rick D. Hoge, Rachid Deriche and Habib Benali. *Detection of Multiple Pathways in the Spinal Cord White Matter Using Q-Ball Imaging*. 5th IEEE International Symposium on Biomedical Imaging : From Nano to Macro (ISBI'08), Paris, France, May 2008
2. Maxime Descoteaux and Rachid Deriche. *Segmentation of Q-Ball Images Using Statistical Surface Evolution*. Medical Image Computing and Computer Assisted Intervention (MICCAI) 2007, Brisbane, Australia, April 2007
3. Demian Wassermann, Maxime Descoteaux and Rachid Deriche. *Diffusion Maps Segmentation of Magnetic Resonance Q-Ball Imaging*. Mathematical Methods in Biomedical Image Analysis (MMBIA) Workshop 2007, held in conjunction with the 11th International Conference on Computer Vision (ICCV), Rio, Bresil, October 2007.
4. Rachid Deriche and Maxime Descoteaux. *Splitting Tracking through crossing fibers : Multidirectional Q-Ball Tracking*. 4th IEEE International Symposium on Biomedical Imaging : From Nano to Macro (ISBI'07) , Arlington, Virginia, USA, April 2007
5. Maxime Descoteaux, Peter Savadjiev, Jennifer Campbell, G. Bruce Pike, Kaleem Siddiqi, Rachid Deriche *Validation and Comparison of Analytical Q-Ball Imaging Methods*. 4th IEEE International Symposium on Biomedical Imaging : From Nano to Macro (ISBI'07) , Arlington, Virginia, USA, April 2007.
6. Maxime Descoteaux, Rachid Deriche, Christophe Lenglet *Diffusion Tensor Sharpening Improves White Matter Tractography*. SPIE Image Processing : Medical Imaging, San Diego, California, USA, February 2007.
7. Maxime Descoteaux, Elaine Angelino, Shaun Fitzgibbons, Rachid Deriche. *A Fast and Robust ODF Estimation Algorithm in Q-Ball Imaging* . 3rd IEEE International Symposium on Biomedical Imaging : From Nano to Macro (ISBI'06), April 2006.
8. Maxime Descoteaux, Elaine Angelino, Shaun Fitzgibbons, Rachid Deriche. *Apparent Diffusion Profile Estimation From High Angular Resolution Diffusion Images*. SPIE Image Processing : Medical Imaging, February 2006.
9. Maxime Descoteaux, Michel Audette, Kiyoyuki Chinzei, Kaleem Siddiqi. *Bone enhancement filtering : application to sinus bone segmentation and simulation of pituitary surgery*. Medical Image Computing and Computer Assisted Intervention (MICCAI) 2005, Palm Springs, California, USA, October 2005.
10. Maxime Descoteaux, Louis Collins, Kaleem Siddiqi. *Geometric Flows for Segmenting Vasculature in MRI : Theory and Validation*. Medical Imaging Computing and Computer-Assisted Intervention (MICCAI) 2004, St-Malo, France, September 2004.
11. Ingerid Reinertsen, Maxime Descoteaux, Simon Drouin, Kaleem Siddiqi, Louis Collins, *Vessel Driven Correction of Brain Shift*. Medical Image Computing and Computer-Assisted Intervention (MICCAI) 2004, St-Malo, France, September 2004.
12. Maxime Descoteaux, Louis Collins, Kaleem Siddiqi. *A Multi-Scale Geometric Flow for Segmenting Vasculature in MRI*. Computer Vision Approaches to Medical Image Analysis (CVAMIA) and Mathematical Methods in Biomedical Image Analysis (MMBIA) Workshop 2004, held in conjunction with the 8th European Conference on Computer Vision (ECCV), Prague, May 2004.
13. M. Chakravarty, G. Bertrand, M. Descoteaux, A.F. Sadikot, L. Collins. *The Creation of a Brain Atlas for Image Guided Neurosurgery using Serial Histological Data*. Medical Image Computing and Computer-Assisted Intervention (MICCAI) 2003, Montréal, September 2003.

Abstracts

1. Aurobrata Ghosh, Maxime Descoteaux and Rachid Deriche. *4th Order Diffusion Tensor Estimation and Application*. ISMRM 16th Scientific Meeting and Exhibition, Toronto, Canada, May 2008.
2. Julien Cohen-Adad, Maxime Descoteaux, Rachid Deriche, Serge Rossignol, Rick D. Hoge, and Habib Benali. *Q-Ball Imaging of the Spinal Cord*. ISMRM 16th Scientific Meeting and Exhibition, Toronto, Canada, May 2008.
3. C. Delmaire, M. Vidailhet, M. Descoteaux, D. Wassermann, F. Bourdain, C. Lenglet, S. Sangla, A. Terrier, R. Deriche and S. Lehericy. *Diffusion Tensor Imaging of White Matter Abnormalities in Patients with Writer's Cramp*. ISMRM 16th Scientific Meeting and Exhibition, Toronto, Canada, May 2008.
4. Alfred Anwander, Maxime Descoteaux and Rachid Deriche. *Probabilistic Q-Ball Tractography Solves Crossings of Callosal Fibers*. Human Brain Mapping Conference, Chicago, USA, June 2007.
5. Maxime Descoteaux and Rachid Deriche *Sharpening Improves Clinically Feasible Q-Ball Imaging Reconstructions*. Joint Annual Meeting ISMRM-ESMRMB, Berlin, Germany, May 19-25th 2007.
6. Peter Savadjiev, Jennifer Campbell, Maxime Descoteaux, Rachid Deriche, G. Bruce Pike, Kaleem Siddiqi *Disambiguation of Complex Subvoxel Fibre Configurations in High Angular Resolution Fibre Tractography*. Joint Annual Meeting ISMRM-ESMRMB, Berlin, Germany, May 19-25th 2007.
7. Maxime Descoteaux, Rachid Deriche , Peter Savadjiev, Jennifer Campbell, Bruce Pike, Kaleem Siddiqi. *Analytic ODF Estimation and Validation in Q-Ball Imaging*. 12th annual meeting of the Organization for Human Brain Mapping (HBM), Florence, Italie, June 11-15th 2006.

Research Reports

1. Maxime Descoteaux, Rachid Deriche and Alfred Anwander. *Deterministic and Probabilistic Q-Ball Tractography : from Diffusion to Sharp Fiber Distributions*. INRIA Research Report 6273, August 2007
2. Maxime Descoteaux and Rachid Deriche. *Q-Ball Images Segmentation Using Region-Based Statistical Surface Evolution*. INRIA Research Report 6257, July 2007.
3. Maxime Descoteaux, Elaine Angelino, Shaun Fitzgibbons, Rachid Deriche. *A Linear and Regularized ODF estimation algorithm to recover multiple fibers in Q-Ball Imaging*. INRIA Research Report 5768, November 2005.
4. Maxime Descoteaux, Elaine Angelino, Shaun Fitzgibbons, Rachid Deriche. *Apparent Diffusion Coefficients from High Angular Resolution Diffusion Images : Estimation and Applications* . INRIA Research Report 5681, September 2005.
5. Maxime Descoteaux. *Affine and Euclidean Geometric Heat Equation for Anisotropic Smoothing*. Shape Analysis Project, School of Computer Science, McGill University, Montréal, April 2003.
6. Maxime Descoteaux. *Solving Shape from Shading using Learning Algorithms*. Computational Perception Project, School of Computer Science, McGill University, Montréal, December 2002.
7. Maxime Descoteaux. *Learning Shape-From-Shading by Network Models*. Machine Learning Project, School of Computer Science, McGill University, Montréal, December 2002.

Thesis

1. Maxime Descoteaux. *High Angular Resolution Diffusion MRI : from Local Estimation to Segmentation and Tractography*. PhD. Thesis. Université de Nice - Sophia Antipolis, INRIA Sophia Antipolis - Méditerranée, February 2008.
2. Maxime Descoteaux. *A Multi-Scale Geometric Flow for Segmenting Vasculature in MRI : Theory and Validation*. Master's Thesis, School Of Computer Science, McGill University, June 2004.

REFERENCES

Alfred Anwander	Max Planck Institute for Human Cognitive and Brain Sciences Leipzig, Germany	Phone : +49 341 35 52 1742 Email : anwander@cbs.mpg.de
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