

Imre Risi Kondor

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Research interests	Machine learning, statistical learning theory, non-commutative harmonic analysis, computational group theory, harmonic analysis on graphs and networks, theoretical computer science, applications in computational physics and biology.
Employment	Center for the Mathematics of Information, California Institute of Technology Postdoctoral fellow September 2009 – Gatsby Computational Neuroscience Unit, University College London Senior post-doctoral research associate September 2007 – August 2009
Education	Columbia University 2002 – 2007 Ph.D. in computer science (thesis defended 08/13/07, degree awarded 10/08). Thesis: “Group theoretical methods in machine learning” Advisor: Tony Jebara. Carnegie Mellon University 2000 – 2002 M.Sc. in knowledge discovery and data mining (machine learning). Advisor: John Lafferty. Von Karman Institute for Fluid Dynamics (Brussels, Belgium) 1999 – 2000 Diploma in computational fluid dynamics. Advisor: Herman Deconinck. Eötvös University (Budapest, Hungary) 1997 – 1999 Diploma in physics, specializing in particle physics, statistical physics and environmental fluid dynamics (without final exam). Advisor: Tamás Tél. University of Cambridge 1992 – 1995 B.A. in mathematics
Internships and collaborations	SAMSI 2008/2009 Program on algebraic methods in systems biology and statistics SAMSI, Research Triangle Park, NC Cavendish Laboratory, Cambridge 2003 – Computational molecular dynamics by learning atomic energy functions with Gábor Csányi and Albert Bartók–Partay National ICT Australia August 2004 with Alex Smola and S.V.N. Vishwanathan Gatsby Computational Neuroscience Unit, UCL July 2004 with Zoubin Ghahramani AT&T Labs Research (Florham Park, New Jersey, U.S.A.) Summer 2002 with Michael Collins and Mehryar Mohri

Short programs and summer schools	Geometry and representation theory of tensors for computer science, statistics, and other areas July 2008 Graduate workshop at MSRI (Berkeley, CA) and workshop at the American Institute of Mathematics (Palo Alto, CA)
	Complex systems summer school June 2007 Santa Fe Institute, New Mexico
Courses taught	Machine Learning II with Yee-Whye Teh and Maneesh Sahani at the Gatsby Unit (spring 2008, spring 2009)
	Teaching Assistant to Tony Jebara for multiple semesters in his machine learning class (2003–2004).
	Manager of the machine learning course in Columbia’s distance learning system (2004)
Tutorials taught	Representation theoretical methods in machine learning October 2008 Eight lecture mini-course at the Gatsby Unit
	Group theory and machine learning October 2007 Machine learning tutorial at the University of Cambridge
	Group theoretical methods in machine learning June 2007 Tutorial at the International Conference of Machine Learning, Corvallis, OR
	Non-commutative harmonic analysis June 2007 Tutorial at the Complex Systems Summer School, Santa Fe
Workshops organized	Workshop on “Learning with Orderings” at NIPS 2009 with Tiberio Caetano, Carlos Guestrin, Jonathan Huang, Guy Lebanon and Marina Meila
	Symposium and workshop on “Algebraic methods in machine learning” at NIPS 2008 with Guy Lebanon and Jason Morton
Reviewer	Journals IEEE Transactions on Pattern Matching and Artificial Intelligence IEEE Signal Processing Letters Journal of Machine Learning Research (editor) Machine Learning Journal
	Conferences Artificial Intelligence and Statistics International Conference on Machine Learning Neural Information Processing Systems
Awards	Best student paper award at ICML 2003.

**Refereed
publications**

- Ranking with Kernels in Fourier space** (R. Kondor and M. Barbosa) COLT 2010
- Graph kernels** (S. V. N. Vishwanathan, K. M. Borgardt, R. Kondor, N. Schraudolf) Journal of Machine Learning Research 11, 2010
- Gaussian Approximation Potentials: the accuracy of quantum mechanics, without the electrons** (A. P. Bartók, M. C. Payne, R. Kondor, G. Csányi) Physical Review Letters **104**, 2010
- A Fourier space algorithm for solving quadratic assignment problems** (R. Kondor) SODA 2010
- The graphlet spectrum** (R. Kondor, N. Shervashidze and K. M. Borgwardt) ICML 2009
- The skew spectrum of graphs** (R. Kondor and K. M. Borgwardt) ICML 2008
- Multi-object tracking with representations of the symmetric group** (R. Kondor, A. Howard and T. Jebara) AISTATS 2007
- Gaussian and Wishart hyperkernels** (R. Kondor and T. Jebara) NIPS 2006
- Probability product kernels** (T. Jebara, R. Kondor and A. Howard) Journal of Machine Learning Research **5**:819-844, 2004.
- Kernels and regularization on graphs** (A. Smola and R. Kondor) COLT 2003.
- Bhattacharyya and expected likelihood kernels** (T. Jebara and R. Kondor) COLT 2003.
- A kernel between sets of vectors** (R. Kondor and T. Jebara) ICML 2003 (best student paper award).
- Diffusion kernels on graphs and other discrete input spaces** (R. Kondor and J. Lafferty) ICML 2002.
- Book chapters**
- Multi-object tracking with representations of the symmetric group** (R. Kondor) in “Inference and Estimation in Probabilistic Time-series models” ed. David Barber, A. Taylan Cemgil, Silvia Chiappa, Cambridge University Press, 2011 (in press).
- Diffusion kernels** (R. Kondor and J.-P. Vert) in ”Kernel Methods in Computational Biology” ed. B. Schölkopf, K. Tsuda and J.-P. Vert, The MIT Press, 2004.
- Patents**
- International Patent Application PCT/GB2009/001414** filed 5/6/09 by Cambridge Enterprise Limited, publication WO2009/147408 A2 (inventors G. Csányi, A P. Bartók, R. Kondor) on Gaussian Approximation Potential invention.

**Unrefereed
publications**

Gaussian approximation potentials: the accuracy of quantum mechanics without the electrons (A. P. Bartók, M. C. Payne, R. Kondor, G. Csányi)
<http://arxiv.org/abs/0910.1019> (2009)

Graph kernels (S.V.N. Vishwanathan, K.M. Borgardt, R. Kondor, N. Schraudolf)
<http://arxiv.org/abs/0807.0093> (2008)

The skew spectrum of functions on finite groups and their homogeneous spaces
(R. Kondor) <http://arxiv.org/abs/0712.4259> (2007)

A novel set of rotationally and translationally invariant features for images based on the non-commutative bispectrum (R. Kondor)
<http://arxiv.org/abs/cs.CV/0701127> (2007)

Multi facet learning in Hilbert spaces (R. Kondor, G. Csanyi, S.E. Ahnert and T. Jebara) Columbia University, Computer Science Technical Report, CUCS-054-05. (2005)

Software

S_n ob. A C++ library for computing fast Fourier transforms on the symmetric group. Available at <http://www.its.caltech.edu/~risi/SnOB/index.html>

References

Andreas Krause (collaborator)
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Peter Dayan (Director of the Gatsby Unit, UCL)
Gatsby Computational Neuroscience Unit, Alexandra House, Room 407, 17 Queen Square, London WC1N 3AR. Tel.: +44 207-679-1175. dayan@gatsby.ucl.ac.uk

Tony Jebara (Ph.D. advisor)
Department of Computer Science, Columbia University, 500 W 120 Street, New York, NY 10027. Tel.: 212-939-7079. jebara@cs.columbia.edu

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