Dan Kushnir

Curriculum Vitae, January 31st, 2012

Contacts

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Current Position

Researcher, Network Performance and Analysis Group, Bell Labs - Murray Hill, NJ

Research Interests

Applied harmonic analysis, Signal Processing, Numerical analysis, Data mining and Machine Learning

Education

Ph.D. in Applied Mathematics, Thesis: Multiscale tools for data analysis, Advisors: Prof. Achi Brandt and Prof. Edriss Titi, Weizmann Institute of Science, Rehovot, Israel, 2004-2008

M.Sc. in Applied Mathematics, Thesis: A fast multi-scale clustering algorithm with application to cold and dark matter simulations, Advisor: Prof. Achi Brandt, Weizmann Institute of Science, Rehovot, Israel, 2001-2004

B.Sc. in Computer Science, The Hebrew University, Jerusalem, Israel, 1997-2001

Employment

J. W. Gibbs Assistant Professor of Applied Mathematics, Department of Mathematics, Yale University, 2008-2011

Checkpoint Software Technologies Research and Development, Programmer, 2000–2001

Publications

Journal Articles

D. Kushnir, An Adaptive Spectral Method for Similarity Search in High Dimensions, in preparation.

R. Talmon, D. Kushnir, R. R. Coifman, Israel Cohen, Sharon Gannot, Parametrization of Linear Systems Using Diffusion Kernels, IEEE Transactions on Signal Processing, 60(3), (2012)

A. Haddad, D. Kushnir, R. R. Coifman, Filtering via a reference set, ***revised for*** Applied and Computational Harmonic Analysis (ACHA) (2011)

D. Kushnir, A. Haddad, R. R. Coifman, Anisotropic diffusion on sub-manifolds with application to Earth structure classification, Applied and Computational Harmonic Analysis (ACHA), 32(2), 280–294 (2012)

D. Kushnir, V. Rokhlin, A highly accurate stiff ODEs solver, revised for SIAM Journal on Scientific Computing (SISC) (2010)

D. Kushnir, M. Galun, A. Brandt, Efficient multilevel eigensolvers with applications to data analysis tasks, IEEE Transaction on Pattern Analysis and Machine Intelligence (TPAMI), vol. 32(8), 1377–1391 (2010)

Y. Goldberg, A. Zakai, D. Kushnir, Y. Ritov, Manifold Learning: the price of normalization, Journal of Machine Learning Research (JMLR), vol. 9, 1909-1939 (2008)

D. Kushnir, M. Galun, A. Brandt, Fast multiscale clustering and manifold identification, special issue on similarity-based pattern recognition, Pattern Recognition, vol. 39(10), 1876–1891 (2006)

D. Kushnir, J. Schumacher, A. Brandt, Geometry of intensive scalar dissipation events in turbulence, Physical Review Letters 97, 124502 (2006)

Conference Proceedings

J. Schumacher, D. Kushnir, A. Brandt, K. R. Sreenivasan, and H. Zilken, Statistics and geometry in high-Schmidt number scalar mixing, Proceedings of the iTi Conference in Turbulence, Progress in Turbulence II, Springer Proceedings in Physics (2005)

Work in Progress

A fast spectral method for similarity search in high dimensions

Teaching

Calculus of Functions of Many Variables (Fall 10, Spring 11)

Ordinary Differential Equations (Spring 09, Fall 09, Spring 10)

Professional Activities and Memberships

Organizer of the applied mathematics seminar in Yale University

Member of the Society of Industrial and Applied Mathematics (SIAM)

Reviewer in the following journals:

Applied and Computational Harmonic Analysis (ACHA)

SIAM Journal on Scientific Computing (SISC)

Journal of Machine Learning Research (JMLR)

Journal of Global Optimization

IEEE Signal Processing Letters

IEEE Intelligent Systems

Reviewer in the following conference proceeding:

European Conference on Computer Vision (ECCV)

Awards

Eshkol scholarship - 200,000 NIS for two years postdoctoral research on fast numerical algorithms for machine learning tasks, 2011

Full funding for participation in the workshop on Large Graphs: Modeling, Algorithms and Applications/Mathematics of Information, Institute for Mathematics and its Application (IMA), University of Minnesota, 2011

Full funding for participation in the workshop on High Dimensional Phenomena/Mathematics of Information, Institute for Mathematics and its Application (IMA), University of Minnesota, 2011

Full funding from the Hausdorff Research Institute for Mathematics at Bonn University, Germany, for giving a talk and participation in the workshop on Manifold Learning, 2011

Society for Industrial and Applied Mathematics (SIAM) early career travel award, 2009

Full funding for participation in the workshop on Multi-Manifold Data Modeling and Applications, Institute for Mathematics and its Application (IMA), University of Minnesota, 2008

3 year funding as a Gibbs Assistant Professor of Applied Mathematics at Yale university, 2008

Full funding for participation in the workshop on Grand Challenge Problems in Computational Astrophysics, IPAM, UCLA 2005

One semester fellowship in the Institute of Pure and Applied Mathematics, UCLA, Program in Multiscale Geometry and Analysis in High Dimensions, 2004

Talks

Applied Mathematics Seminar on Anisotropic Diffusion Maps with Applications to Inverse Problems, Colorado State University (29/09/2011)

Invited talk on Anisotropic Diffusion Maps with Applications to Inverse Problems, workshop on Manifold Learning, Hausdorff Research Institute for Mathematics at Bonn University, Germany, (31/05/2011)

Mathematics colloquium on Anisotropic Diffusion Maps with Applications to Inverse Problems, University of Connecticut (24/03/2011)

Computer Science colloquium on Anisotropic Diffusion Maps with Applications to Inverse Problems, Technion, Israel, (26/12/2010)

Invited tutorial on Multilevel Eigensolvers for the Workshop on Numerical Methods in Machine Learning, Neural Information Processing (NIPS 2010), Whistler, BC, Canada

Invited talk for Imaging and Computing Seminar at MIT, Mathematics Dept. on "Anisotropic Diffusion Maps with Application to Earth Layers Structure Classification"

"Anisotropic Diffusion Maps with Application to Earth Layers Structure Classification" Applied Mathematics Seminar at Yale University, (26/10/2010)

"Anisotropic Diffusion Maps with Application to Earth Layers Structure Classification" invited talk for IDeAS Seminar at Mathematics Departments at Princeton University, (18/10/2010)

"Anisotropic Diffusion Maps with Application to Earth Layers Structure Classification", Center for Scientific Computing and Mathematical Modeling seminar, University of Maryland, (15/09/2010)

"Anisotropic Diffusion Maps with Application to Earth Layers Structure Detection", SIAM Conference on Imaging Sciences, Chicago, (14/04/2010)

"Multilevel Methods for Data Analysis", Applied Math Seminar, Yale University, (21/10/2008)

"An Efficient Multilevel Eigensolver with Applications to Data Analysis Tasks", Applied Mathematics Seminar, Stanford University, (22/02/2008)

"An Efficient Multilevel Eigensolver with Applications to Data Analysis Tasks", Applied and Computational Mathematics Colloquia, California Institute of Technology CALTECH, (20/02/2008)

"Fast Multiscale Clustering and Manifold Identification", Applied Mathematics Seminar, University of California at Irvine, (19/02/2008)

"Multiscale clustering and manifold identification", IMA Post-doc seminar, University of Minnesota, (26/04/2005)

"Multiscale clustering and manifold identification", Post-doc seminar of the Multi-Scale Geometry and Analysis in High Dimensions Program, IPAM UCLA, (15/10/2004)

Workshops and Conferences

Workshop on High Dimensional Phenomena/Mathematics of Information, Institute for Mathematics and its Application (IMA), University of Minnesota, 2011

Workshop on Manifold Learning Full funding from the Hausdorff Research Institute for Mathematics at Bonn University, Germany, 2011

SIAM Conference on Imaging Sciences, received SIAM Early Career Travel Award, Chicago, 2010

Workshop on Multi-Manifold Data Modeling and Applications, Institute for Mathematics and its Application (IMA), University of Minnesota, 2008

Workshop on Mathematics of Knowledge and Search Engines, IPAM, UCLA 2007

Workshop on Grand Challenge Problems in Computational Astrophysics, IPAM, UCLA 2005

Workshop on Multiscale Geometry and Analysis in High Dimension in IPAM, UCLA 2004