SOFYA CHEPUSHTANOVA

PERSONAL INFORMATION

Address	Department of Mathematics and Computer Science, Wilkes University, 84 West South Street, Wilkes-Barre, PA 18766
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EDUCATION

• AUGUST 2015	**Ph.D. in Mathematics**, Colorado State University, Fort Collins, CO
Dissertation	"ALGORITHMS FOR FEATURE SELECTION AND PATTERN RECOGNITION ON GRASSMANN MANIFOLDS"
Advisor	Dr. Michael Kirby
• MAY 2006	**M.S. in Mathematics**, Michigan Technological University, Houghton, MI
Thesis	"SLOW RUPTURE OF VISCOUS FILMS BETWEEN TWO PARALLEL NEEDLES."
Advisor	Dr. Igor Kliakhandler
• JUNE 1994	**B.S. in Applied Mathematics**, Urals State University, Russia
Diploma	"ITERATIVE PROCESSES FOR MONOTONE OPERATOR EQUATIONS OF THE FIRST KIND."
Advisor	Dr. Vladimir Vasin

EMPLOYMENT

• 2015 – present	Assistant Professor, Department of Mathematics and Computer Science, Wilkes University
• 1994 – 2004	Financial Analyst, SKB-Bank and Moscow Business World Bank (MDM-Bank)
• 1994	Intern, Institute of Mathematics and Mechanics, Ural Branch of the Russian Academy of Sciences

TEACHING EXPERIENCE

• Instructor	- Calculus I
Wilkes Univeristy	- Numerical Linear Algebra
	- Numerical Analysis
	- Precalculus
• Instructor	- Calculus for Physical Scientists I
Colorado State University	- Calculus for Physical Scientists II

- Calculus for Physical Scientists III
- Introduction to Ordinary Differential Equations

• Teaching Assistant
Colorado State Univeristy

- Mathematical Algorithms in Matlab (Spring 2012)

• Private Tutor

- Tutored students in Calculus, Linear Algebra, Optimization Methods, and Linear Programming.

RESEARCH INTERESTS

Geometric data analysis. Optimization. Numerical linear algebra. High-dimensional data sets. Machine learning. Manifold learning. Computational topology. Hyperspectral imagery.

PUBLICATIONS

- Henry Adams, Tegan Emerson, Michael Kirby, Rachel Neville, Chris Peterson, Patrick Shipman, Sofya Chepushtanova, Eric Hanson, Francis Motta, and Lori Ziegelmeier.
Persistence images: a stable vector representation of persistent homology.
Journal of Machine Learning Research, 18(8):1–35, 2017

- Sofya Chepushtanova and Michael Kirby.
Sparse Grassmannian embeddings for hyperspectral data representation and classification.
IEEE Geoscience and Remote Sensing Letters, PP(99):1–5, 2017

- Sofya Chepushtanova, Michael Kirby, Chris Peterson, and Lori Ziegelmeier.
Persistent homology on Grassmann manifolds for analysis of hyperspectral movies.
Computational Topology in Image Context: 6th International Workshop (CTIC) 2016, LNCS 9667, pp. 228-239, 2016.

- Sofya Chepushtanova, Michael Kirby, Chris Peterson, and Lori Ziegelmeier.
An application of persistent homology on Grassmann manifolds for the detection of signals in hyperspectral imagery.
Proc. IEEE IGARSS 2015.

- Sofya Chepushtanova and Michael Kirby.
Classification of hyperspectral imagery on embedded Grassmannians.
Proc. 6th IEEE WHISPERS 2014.

- Sofya Chepushtanova, Christopher Gittins, and Michael Kirby.
Band selection in hyperspectral imagery using sparse support vector machines.
Proc. SPIE, 9088:90881F–90881F–15, 2014

- Kun Wang, Vineet Bhandari, Sofya Chepushtanova, Greg Huber, Stephen O'Hara, Corey S. O'Hern, Mark D. Shattuck, and Michael Kirby.
Which biomarkers reveal neonatal sepsis?
PLoS ONE 8(12), DOI:10.1371/journal.pone.0082700, 2013

- Sofya Chepushtanova and Igor L. Kliakhandler.
  Slow Rupture of Viscous Films Between Parallel Needles.
  Journal of Fluid Mechanics, 573:297–310, 2007

PRESENTED WORK, CONFERENCES, AND WORKSHOPS

- March 2016 — Mathematics Department Seminar, University of Scranton, Scranton, PA
  Talk — *"Persistent Homology and Its Alternative Vector Representation"*

- October 2015 — 2015 Luzerne and Lackawanna Counties Mathematics Symposium, Dallas, PA
  Talk — *"Persistent Homology on Grassmann manifolds for Analysis of Hyperspectral Movies"*

- July 2015 — 2015 DTRA/NSF Workshop on Algorithms for Threat Detection, Arlington, VA
  Poster presentation — *"Persistent Homology for HSI Data Analysis under the Grassmannian Framework"*

- January 2015 — 2015 Joint Mathematics Meetings, San Antonio, TX
  Talk — *"Sparse Grassmannian Embeddings for Hyperspectral Image Classification"*

- November 7, 2014 — Amazon Graduate Research Symposium, Seattle, WA
  Poster Presentation — *"Geometric Data Analysis: Grassmannian Framework for Set-to-Set Pattern Recognition"*

- May 2014 — SPIE DSS 2014, Baltimore, MD
  Poster Presentation — *"Band Selection in Hyperspectral Imagery Using Sparse Support Vector Machines"*

- March 2014 — Algorithms for Threat Detection Program Review, Boulder, CO
  Talk — *"Exploring Uses of Persistent Homology for Hyperspectral Remote Sensing"*

- March 2014 — Conference on Data Analysis (CoDA) 2014, Santa Fe, NM
  Poster Presentation — *"An Application of Persistent Homology on Grassmann Manifolds to the Detection of Signals in Hyperspectral Imagery"*

- February 2014 — Argonne National Laboratory
  Talk — *"Data Analysis Methods and Applications: Hyperspectral Band Selection and Data Classification on Embedded Grassmannians"*

- February 2014 — Topological Data Analysis Workshop, SAMSI, NC
  Poster Presentation — *"Set-to-Set Pattern Recognition on Grassmann Manifolds"*

- January 2014 — 2014 Joint Mathematics Meetings, Baltimore, MD
  Talk — *"Pattern Classification by Ellipsoidal Machines Using Semidefinite Programming"*

- September 2013 — IMA Hot Topics Workshop on Imaging in Geospatial Applications, Minneapolis, MN
  Poster Presentation — *"Sparse SVMs for Hyperspectral Band Selection"*

- June 2013 — Institute for Mathematics and its Applications (IMA), Minneapolis, MN
  New Directions Short Course on *"Applied Statistics and Machine Learning"*

- March 2013 — 2013 Front Range Applied Mathematics (FRAM) Student Conference, Denver, CO

Talk	*"Comprehensive Analysis of Hyperspectral Data using Band Selection based on Sparse Support Vector Machines"*
• January 2013	2013 Joint Mathematics Meetings, San Diego, CA
Talk	*"Hyperspectral Band Selection Using Sparse Support Vector Machines"*
• November 2012	2012 DTRA/NSF/NGA Algorithm Workshop, San Diego, CA
Poster Presentation	*"Classification of Data on Embedded Grassmannians"*
• July 2012	2012 SIAM Annual Meeting, Minneapolis, MN
Talk	*"Sparse Support Vector Machines for Classification on Grassmannians"*
• February 2012	Conference on Data Analysis (CoDA) 2012, Santa Fe, NM
Poster Presentation	*"Algorithms and Applications of Sparse Support Vector Machines"*
	(Los Alamos Statistical Sciences Conference Grant winner)
• January 2012	Greenslopes Graduate Student Seminar at CSU
Talk	*"Introduction to Support Vector Machines"*
• June 2011	2011 DTRA/NSF Algorithm Workshop, Boston, MA
Talk	*"Band Selection for Classification of Hyperspectral Data Based on Sparsity of ℓ_1-norm Support Vector Machines"*
• Fall 2010	ℓ_1-norm Minimization and Sparsity Workshop at Pattern Analysis Laboratory (CSU)
Talk	*Various presentations at semester-long reading course*
• June 2010	2010 DTRA/NSF Algorithm Workshop, Chapel Hill, NC
Talk	*"Support Vector Machine Optimization Problems: A Comparative Study Based on Primal-Dual Interior Points Method"*
• November 2005	2005 58th Annual Meeting of the Division of Fluid Dynamics, Chicago, IL
Talk	*"Theory and Experiments of Slow Rupture of Viscous Films"*

SERVICE AND OUTREACH

• 2016 – 2017	Academic advisor, Wilkes University
• 2016	Student project presentation seminar advisor, Wilkes University
• 2015 – 2017	First Lego League team and summer camp mentor and coach, Wilkes University
• 2013 – 2016	Refereed for IEEE Geoscience and Remote Sensing Letters and IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing
• 2011, 2012, 2014	Math Circles Volunteer, Colorado State University: *Math Circles is a summer math enrichment program for 8th-10th grade students. Served as a presenter and group leader.*

• 2009 – 2012	Math Day Volunteer, Colorado State University: *Math Day is an annual outreach event at CSU for high school students from Colorado, Nebraska, and Wyoming that includes a challenging exam as well as a team math competition. Served as an exam proctor and timer in the team competition.*
• 2012 – 2013	Treasurer of Student Chapter of SIAM, Colorado State University: *received and took custody of Chapter funds, submitted financial reports.*

SKILLS

• Programming Languages	Matlab, MatlabMPI, Python, R
• Computer Systems	Linux, Windows
• Computing Software	Maple, Mathematica, Macaulay2, WeBWorK, LaTeX
• Spoken Languages	English, Russian

PROFESSIONAL AFFILIATIONS

American Mathematical Society and Society for Industrial and Applied Mathematics

REFERENCES

• Michael Kirby	Professor, Colorado State University (970) 491-6850, kirby@math.colostate.edu
• Dan Bates (teaching)	Associate Professor, Colorado State University (970) 491-1037, bates@math.colostate.edu
• Igor Kliakhandler	President, Intergrid Mideast Group LLC (832) 382-5335, igor@mtu.edu
• Chris Peterson	Professor, Colorado State University (970) 491-5153, peterson@math.colostate.edu
• Mary Pilgrim (teaching)	Assistant Professor, Colorado State University (970) 491-6440, pilgrim@math.colostate.edu