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

RESEARCH INTERESTS

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

PUBLICATIONS

- Sofya Chepushtanova and Michael Kirby.
  Sparse Grassmannian embeddings for hyperspectral data representation and classification.
  IEEE Geoscience and Remote Sensing Letters, 14(3):434–438, 2017

- 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, 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

GRANTS (INTERNAL FUNDING)

Wilkes University Mentoring Grant "Topological analysis of protein dynamics using persistent homology", 2017 (in collaboration with Prof. Del Lucent), $9100

Wilkes University Mentoring Grant for continuing undergraduate research project on creation and analysis of Wilkes Pet Image Dataset, 2017 (in collaboration with Prof. Anthony Kapolka), $10998

Wilkes University Research and Scholarship Grant "Topological analysis of protein dynamics using persistent homology barcodes", 2016 (in collaboration with Prof. Del Lucent), $30,000

Wilkes University Mentoring Grant "Topological analysis of protein dynamics using persistent homology", 2016 (in collaboration with Prof. Del Lucent), $9100

Wilkes University Mentoring Grant for undegraduate research project on creation and analysis of Wilkes Pet Image Dataset, 2016 (in collaboration with Prof. Anthony Kapolka), $11402

PRESENTATIONS

- October 2017 — *Talk*
  2017 Luzerne and Lackawanna Counties Mathematics Symposium, Dallas, PA
  "Topological data analysis of protein dynamics using persistent homology: an undergraduate research project"

- June 2017 — *Poster presentation*
  TDA: Theory and Applications Conference at Macalester College, St. Paul, MN
  "Persistent Homology on Grassmann manifolds for Analysis of Hyperspectral Movies"

- March 2017 — *Oral and poster presentations*
  2017 Wilkes University Scholarship Symposium, Wilkes-Barre, PA
  "Topological analysis of protein dynamics using persistent homology" - in collaboration with Del Lucent

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

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

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

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

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

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

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

- March 2014 — *Poster Presentation*
  Conference on Data Analysis (CoDA) 2014, Santa Fe, NM
  "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"*

TEACHING

• Instructor Wilkes Univeristy	- Abstract Algebra I - Numerical Linear Algebra - Numerical Analysis - Calculus I - Precalculus
• Instructor Colorado State University	- Calculus for Physical Scientists I - Calculus for Physical Scientists II - Calculus for Physical Scientists III - Introduction to Ordinary Differential Equations
• Teaching Assistant Colorado State Univeristy	- Mathematical Algorithms in Matlab
• Private Tutor	- Tutored students in Calculus, Linear Algebra, Optimization Methods, and Linear Programming.

STUDENT ADVISING, WILKES UNIVERSITY

• 2016 – present	Academic advisor for four undergraduate students
• 2016 – present	Research co-advisor with Prof. Anthony Kapolka, summer mentoring projects on *Animal Image Dataset Processing and Classification:*
2017	Justin Bodner, Simon Chu, Michael Walton
2016	Corey Smithmyer, Mark Roche, Abigail Sanders
• 2016 – present	Research co-advisor with Prof. Del Lucent, summer mentoring projects on *Topological Data Analysis of Protein Dynamics:*
2017	Michael O'Brien, Daniel Sales
2016	Maria Notaro
• 2016	Advised two undergraduate student projects for MTH-392 Senior Seminar

SERVICE AND OUTREACH

• 2013 – present	Referee for the IEEE Journals: Geoscience and Remote Sensing Letters, Journal of Selected Topics in Applied Earth Observations and Remote Sensing, Transactions on Knowledge and Data Engineering, and Transactions on Geoscience and Remote Sensing

• 2016 – 2017	Represented the Department of Mathematics and Computer Science at various Wilkes University Open VIP Day and Open Houses events
• 2016 – 2017	Hiring Committee Member, Department of Mathematics and Computer Science
• 2016 – present	Wilkes University Faculty Supervisor for student teachers
• 2017 – present	Co-advisor, Department of Mathematics and Computer Science Math and CS Student Club
• 2017 – present	Co-organizer of Integration Bee Contest for Wilkes University students
• 2016 – present	Wilkes University Library Committee member and secretary
• 2016, 2017	WEBS summer camp instructor, Wilkes University
• 2015, 2016	First Lego League team parent mentor (2015) and co-coach (2016)
• 2011, 2012, 2014	Math Circles Volunteer, Colorado State University
• 2009 – 2012	Math Day Volunteer, Colorado State University
• 2012 – 2013	Treasurer of Student Chapter of SIAM, Colorado State University

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
- Society for Industrial and Applied Mathematics