Elizabeth Newman | Curriculum Vitae

Emory University – 400 Dowman Drive – Atlanta, GA 30322

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Professional experience

Emory University Department of Mathematics	Atlanta, GA
Postdoctoral Fellow	September 1 – Present
Distinguished Visiting Assistant Professor in Scientific Computing	June 2019 – August 2021
IBM TJ Watson Research Center	Yorktown, NY
Visiting Scholar	Summer 2017, 2018
Tufts University Department of Mathematics	Medford, MA
Teaching and Research Assistant	August 2014 - May 2019

Education

Tufts University	Medford, MA
Ph.D. in Mathematics	May 2019
M.S. in Mathematics	May 2016
Haverford College	Haverford, PA
Bachelor of Science in Mathematics and Statistics	May 2014
Member, varsity women's soccer and softball teams. Centennial Conference Honor Roll all years.	

Research interests

Numerical linear algebra and multlinear algebra, machine learning, deep neural networks, scientific computing, image classification and recognition, optimization

Publications

Misha Kilmer, Lior Horesh, Haim Avron and Elizabeth Newman. *Tensor-Tensor Algebra for Optimal Representation and Compression of Multiway Data*. Accepted to PNAS, Februarry 2021. Available on PNAS and related version on arXiv:2001.00046.

Elizabeth Newman, Lars Ruthotto, Joseph Hart, and Bart van Bloemen Waanders. *Train Like a (Var)Pro: Efficient Training of Neural Networks with Variable Projection*. Submitted to SIMODS, August 2020. Available on arXiv:2007.13171.

Elizabeth Newman and Misha Kilmer. *Non-negative tensor patch dictionary approaches for image compression and deblurring applications*. Accepted to SIIMS, April 2020. Available on arXiv:1910.00993.

Elizabeth Newman. *A Step in the Right Dimension: Tensor Algebra and Applications*. Dissertation.

Elizabeth Newman, Lior Horesh, Haim Avron, Misha Kilmer. *Stable tensor neural networks for rapid deep learning*. Available on arXiv:1811.06569.

Elizabeth Newman, Misha Kilmer, Lior Horesh. *Image classification using local tensor singular value decompositions*. IEEE CAMSAP, 2017 (DOI:10.1109/CAMSAP.2017.8313137). Available on arXiv:1706.09693.

Patents

Kilmer (Tufts), Horesh (IBM), Avron (Tel Aviv), Newman (Tufts). *System and method for optimal multi-dimensional data compression by tensor-tensor decompositions*. Patent reference P201807026US01, filed 2019.

Newman (Tufts), Horesh (IBM), Avron (Tel Aviv), Kilmer (Tufts). *Generating and managing deep tensor neural networks*. Patent reference P201803885US01, filed 2018.

Current Students

Jonathan Vaylou, Emory University   September 2020 - Present

Scholarly Inquiry and Research Experience (SIRE) Program for undergraduates

Conferences and workshops attended

Minisymposium Organizer:

SIAM Annual Meeting   July 2020

"A Deep Look at Neural Networks: A Deep Look at Neural Networks with Applications in Scientific Machine Learning."
Accepted, but not held due to COVID-19 pandemic.

Travel awards:

SIAM Student Travel Award

SIAM Conference on Computational Science and Engineering	February 2019
SIAM Conference on Applied Linear Algebra	May 2018

Graduate Student Travel Fund from Tufts University

SIAM Conference on Computational Science and Engineering	February 2019
SIAM Conference on Imaging Science	June 2018

Conferences:

Georgia Scientific Computing Symposium	February 2021
BIRS Workshop: Optimization under Uncertainty: Learning and Decision Making (Online) (21w5167) (recording)	Februray 2021
NLA Communications (recording)	November 2020
SIAM Conference on Imaging Science	July 2020
SIAM Conference on Mathematics of Data Science	May 2020
SIAM Southeastern Atlantic Section	September, 2019
SIAM Conference on Computational Science and Engineering	February 2019
SIAM Conference on Imaging Science	June 2018
SIAM Conference on Applied Linear Algebra	May 2018
15th Copper Mountain Conference On Iterative Methods	March 2018
SIAM Annual Meeting	July 2016

Invited talks:

Communications in NLA	Emory University, November 2020
Bi-College Colloquium	Haverford College/Bryn Mawr College, December 2019
Computational Math Seminar	Emory University, September 2019
Schlumberger Doll Research	Cambridge, MA, May 2019
SIAM Student Chapter	Tufts University, September 2018

IBM TJ Watson Research Center	Yorktown, NY, August 2018
Computational and Applied Math Seminar	Tufts University, March 2018

Teaching experience

Awards:

Distinguished Teaching Prize, Tufts Department of Mathematics	Tufts University, 2016/2017

Instructor:

MATH347 Nonlinear Optimization: primary instructor	Emory University, Spring 2021
MATH221 Linear Algebra: primary instructor	Emory University, Fall 2020
MATH221 Linear Algebra: primary instructor	Emory University, Spring 2020
MATH221 Linear Algebra: primary instructor	Emory University, Fall 2019
MATH0042 Calculus III: recitation leader	Tufts University, Spring 2018
MATH0034 Calculus II: recitation leader	Tufts University, Fall 2017
MATH0034 Calculus II: primary instructor	Tufts University, Spring 2016

Teaching Assistant:

MATH0128 Numerical Linear Algebra	Tufts University, Spring 2019
MATH0126 Numerical Analysis	Tufts University, Fall 2018
MATH0019 Math of Social Choice	Tufts University, Fall 2015
MATH0136 Analysis II	Tufts University, Spring 2015
MATH0135 Analysis I	Tufts University, Fall 2014

Memberships and departmental service

Departmental service:

The Mathematical and Interdisciplinary Contest in Modeling	February 2021

Faculty Advisor

SIAM Tufts University Student Chapter	July 2016 - May 2018

President

Responsibilities included networking with industry professionals to speak to our chapter. Speakers included professionals from large companies such as Microsoft, FactSet, and Optum, and smaller start-ups like CiBO and SessionM.

SIAM Tufts University Student Chapter	July 2015 - May 2016

Vice President

Tufts Graduate Student Council	Fall 2015 - Spring 2016

Treasurer

Tufts Organization of Graduate Students in Mathematics	Sept. 2014 - May 2015

First-year representative

Memberships:

Society for Industrial and Applied Mathematics (SIAM)

American Mathematical Society (AMS)

Association for Women in Mathematics (AWM)

Programming skills

Matlab

Python, Pytorch

Mathematica

Microsoft Office products