Keaton Hamm

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Department of Mathematics
University of Texas at Arlington
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Arlington, TX 76019

EDUCATION

Ph.D. Mathematics, Texas A&M University – 2015

- ⊕ Advisors: Thomas Schlumprecht and N. Sivakumar
- ⊕ Dissertation Title: On the Interpolation of Smooth Functions via Translates of Radial Basis Functions

B.S. Mathematics (Honors), Texas A&M University – 2010

B.S. Chemical Engineering, Texas A&M University – 2010

EMPLOYMENT

2020 – Present: University of Texas at Arlington, Assistant Professor

2018 – 2020: University of Arizona, Postdoctoral Research Associate

- ⊕ Researcher in the NSF TRIPODS Program (Transdisciplinary Research in Principles of Data Science)
- ⊕ Supervisors: David Glickenstein (Math) and Stephen Kobourov (Computer Science)

2015 – 2018: Vanderbilt University, Assistant Professor (Non-Tenure Track)

- ⊕ Postdoctoral Supervisors: Akram Aldroubi and Alex Powell

2010 – 2015: Texas A&M University, Graduate Assistant

FUNDING

Federal Grants:

- ⊕ PI: Army Research Office (ARO) W911NF2310213 – "Optimal Transport Methods for Nonlinear Dimensionality Reduction and Applications," June 2023- May 2026
    - o Total award amount – $304,447.30
- ⊕ coPI (Hristo Kojouharov PI, coPIs Christopher Kribs, Souvik Roy, Pedro Maia): National Science Foundation (NSF) – "RTG: Vertically Integrated Interdisciplinary Training in Mathematics for Human Health," Sept 2023 – Aug 2028
    - o Total award amount – $1,099,792
- ⊕ coPI (Jianzhong Su PI, coPIs Gautam Das, Bryan Samuel, Suvra Pal, Shuo Linda Wang, Hong Jiang, Chengkai Li, Li Wang, William Beksi, Ren-Cang Li): United States Department of Agriculture (USDA) Agricultural Research Service (ARS) – "USDA ARS

[Research Apprenticeship Program at University of Texas at Arlington](),” Aug 2022 – Sept 2026
- o Total initial award amount – $484,440.30
- o 2 year extension in 2024 – $333,522 (in addition to initial award)
- ⊕ coPI (Jianzhong Su PI, coPIs Jaime Cantu, and Dengdeng Yu): United States Department of Agriculture (USDA) – “[Developing an Alliance for Training and Apprenticeship in Climate-Smart Agriculture (DATA-Ag)](),” Nov 2021 – Oct 2024
  - o Total award amount – $500,000.50
- ⊕ PI: Army Research Office (ARO) W911NF-20-1-0076 – “CUR Decompositions and Clustering Applications,” May 2020 – Feb. 2021 (at University of Arizona)
  - o Total award amount – $48,866

Conference Grants:
- ⊕ coPI (with Akram Aldroubi, Javad Mashreghi, and Armenak Petrosyan): Canadian National Science Foundation, “[Focused Program on Data Science, Approximation Theory, and Harmonic Analysis](),” Fields Institute, Toronto, Canada, May-June 2022 – $70,000 (CAD)

Local Grants:
- ⊕ PI: UTA Research Enhancement Program (REP), “Optimal Transport Methods in Nonlinear Dimensionality Reduction,” June 2022 – Aug 2023 – $10,000
- ⊕ coPI (with Vahan Huroyan): Postdoc Collaborative Grant Award – University of Arizona Department of Mathematics Postdoc Committee, May-July 2019 – $3,000

Travel Awards:
- ⊕ MAA/PIC Math Workshop on Data Science, Provo, Utah, May 2019 ($1,000)
- ⊕ ICERM Workshop on Optimization Methods in Computer Vision and Image Processing, Providence, RI, May 2019 ($1,300)
- ⊕ ICERM Topical Workshop on Frame Theory and Exponential Bases, Providence, RI, June 2018 ($1,400)
- ⊕ International Conference on Mathematics of Data Science (ICDMS), Norfolk, VA, November 2018 ($500)
- ⊕ February Fourier Talks (FFT), College Park, MD, February 2019 ($350)
- ⊕ February Fourier Talks (FFT), College Park, MD, February 2018 ($350)

P U B L I C A T I O N S
(* indicates Graduate Student Collaborators, ** indicates Undergraduate Student Collaborators)

It is the convention in Mathematics and Theoretical Computer Science to place authors in alphabetical order.

Standards of authorship in these fields is assumed to be equal contribution among all authors unless otherwise specified.

The role of Corresponding Author in these publications is considered to be unimportant (and typically merely an extra burden) and is thus rotated among the authors. Therefore, it is not listed in the publications below.

Submitted Preprints (5)

[S5] Brian Bell*, Michael Geyer, David Glickenstein, Keaton Hamm, Carlos Scheidegger, Amanda Fernandez, and Juston Moore, **Persistent Classification: Understanding Adversarial Attacks by Studying Decision Boundary Dynamics** (Approximately 25 pages, Accepted pending minor revisions to *Statistical Analysis and Data Mining*) [PDF](#)

[S4] Keaton Hamm, Caroline Moosmüller, Bernhard Schmitzer, and Matthew Thorpe, **Manifold Learning in Wasserstein Space** (Approximately 50 pages, Revision submitted) [PDF](#)

[S3] Keaton Hamm and Varun Khurana*, **Wasserstein approximation schemes based on Voronoi partitions** (Approximately 15 pages, Submitted.) [PDF](#)

[S2] Zahidur Talukder*, Muhammad Rana*, Keaton Hamm, Mohamed Islam, **FedSRC: Federated Learning with Self-Regulating Clients** (Approximately 21 pages, Submitted.)

[S1] Keaton Hamm, Zhaoying Lu*, Wenbo Ouyang*, and Helen Zhang, **Boosting Nyström Method**, (Approximately 10 pages, Submitted) [PDF](#)

Peer-Reviewed Journal Articles (21)

[J21] Alex Cloninger, Keaton Hamm, Varun Khurana*, and Caroline Moosmüller, **Linearized Wasserstein Dimensionality Reduction with Approximation Guarantees,** *Applied and Computational Harmonic Analysis*, In Press (Approximately 40 pages). [PDF](#)

[J20] Keaton Hamm and Andrzej Korzeniowski, **On Wasserstein distances for affine transformations of random vectors**, *Foundations of Data Science,* 6(4) (2024), 468-491. [PDF](#), [Journal Version](#)

[J19] Keaton Hamm, Nick Henscheid, and Shujie Kang, **Wassmap: Wasserstein Isometric Mapping for Image Manifold Learning**, *SIAM Journal on Mathematics of Data Science*, 5(2) (2023), 475-501. [PDF](#), [Journal Version](#)

[J18] Keaton Hamm, **Generalized Pseudoskeleton Decompositions**, *Linear Algebra and its Applications*, 664 (2023), 236-252. [PDF](#), [Journal Version](#)

[J17] HanQin Cai, Keaton Hamm, Longxiu Huang, and Deanna Needell, **Mode-wise Tensor Decompositions: Multi-dimensional Generalizations of CUR Decompositions,** *Journal of Machine Learning* Research, 22 (2021), 1-36. [Journal Version (Open Access)](#)

[J16] HanQin Cai, Keaton Hamm, Longxiu Huang, and Deanna Needell **Robust CUR Decompositions: Theory and Imaging Applications,** *SIAM Journal on Imaging Sciences*, 14(4) (2021), 1472-1503. PDF, Journal Version

[J15] Keaton Hamm, Benjamin Hayes, and Armenak Petrosyan, **An Operator Theoretic Approach to the Convergence of Rearranged Fourier Series,** *Journal d'Analyse Mathematique*, 143 (2021), 503-534. PDF, Journal Version,Video of ICERM Presentation

[J14] Keaton Hamm and Longxiu Huang, **Perturbations of CUR Decompositions,** *SIAM Journal on Matrix Analysis and Applications*, 42(1) (2021), 351-375. PDF, Journal Version

[J13] HanQin Cai, Keaton Hamm, Longxiu Huang, Jiaqi Li**, and Tao Wang, **Rapid Robust Principal Component Analysis: CUR Accelerated Inexact Low Rank Estimation,** *IEEE Signal Processing Letters*, 28 (2020), 116-120. PDF, Journal Version

[J12] Reyan Ahmed*, Greg Bodwin, Faryad Darabi Sahneh, Keaton Hamm, Stephen Kobourov, Mohammad Javad Latifi Jebelli*, and Richard Spence*, **Graph Spanners: A Tutorial Review,** *Computer Science Review*, 37 (2020), 100253. PDF, Journal Version

[J11] Keaton Hamm and Longxiu Huang, **Stability of Sampling for CUR Decompositions,** *Foundations of Data Science*, 2(2) (2020), 83-99. PDF, Journal Version

[J10] Keaton Hamm and Longxiu Huang, **Perspectives on CUR Approximations,** *Applied and Computational Harmonic Analysis,* 48(3) (2020), 1088-1099. PDF, Journal Version

[J9] Akram Aldroubi, Keaton Hamm, Ahmet Bugra Koku, and Ali Sekmen, **CUR Decompositions, Similarity Matrices, and Subspace Clustering,** *Frontiers in Applied Mathematics and Statistics – Mathematics of Computation and Data Science Section*, Vol. 4, Article 65 (2019), 1-16. PDF, Journal Version (Open Access)

[J8] Keaton Hamm, **On the Gibbs—Wilbraham Phenomenon for Sampling and Interpolatory Series,** *Proceedings of the Edinburgh Mathematical Society*, Vol. 62 (2019), 1163-1171. PDF, Journal Version

[J7] Keaton Hamm and Jeff Ledford, **Regular Families of Kernels for Nonlinear Approximation**, *Journal of Mathematical Analysis and Applications,* 475(2) (2019), 1317-1340. PDF, Journal Version

[J6] Keaton Hamm and Jeff Ledford, **On the Structure and Interpolation Properties of Quasi Shift-Invariant Spaces**, *Journal of Functional Analysis*, 274(7) (2018) 1959-1992. PDF, Journal Version

[J5] Keaton Hamm and Jeff Ledford, **Cardinal Interpolation with General Multiquadrics: Convergence Rates**, *Advances in Computational Mathematics*, 44(2) (2018), 1205-1233. PDF, Journal Version

[J4] Jean-Luc Bouchot and Keaton Hamm, **Stability and Robustness of RBF Interpolation**, *Sampling Theory in Signal and Image Processing*, 16 (2017), 37-53. PDF, Journal Version

[J3] Keaton Hamm, **Nonuniform Sampling and Recovery of Bandlimited Functions in Higher Dimensions**, *Journal of Mathematical Analysis and Applications*, 240(2) (2017), 1459-1478. PDF, Journal Version

[J2] Keaton Hamm and Jeff Ledford, **Cardinal Interpolation with General Multiquadrics**, *Advances in Computational Mathematics*, 42(5) (2016), 1149-1186. PDF, Journal Version

[J1] Keaton Hamm, **Approximation Rates for Interpolation of Sobolev Functions via Gaussians and Allied Functions**, *Journal of Approximation Theory*, 189 (2015), 101-122. PDF, Journal Version

Refereed Conference Publications (12)

[C12] Reyan Ahmed, Keaton Hamm, Stephen Kobourov, Mohammad Javad Latifi Jebelli, Faryad Sahneh, and Richard Spence, **Multi-priority Graph Sparsification**, *34th International Workshop on Combinatorial Algorithms (IWOCA 2023)*, Tainan, Taiwan. PDF, Conference Version

[C11] Keaton Hamm, Mohamed Meskini*, and HanQin Cai, **Riemannian CUR Decompositions for Robust Principal Component Analysis**, ICML 2022 Workshop on Topology, Algebra, and Geometry in Machine Learning. PMLR 2022. Conference Version (Open Access)

[C10] Reyan Ahmed*, Greg Bodwin, Keaton Hamm, Stephen Kobourov, and Richard Spence*, **On Additive Spanners in Weighted Graphs with Local Error**, *47th International Workshop on Graph-Theoretic Concepts in Computer Science (WG 2021),* Warsaw, Poland. PDF, Conference Version

[C9] Reyan Ahmed*, Greg Bodwin, Faryad Darabi Sahneh, Keaton Hamm, Stephen Kobourov, and Richard Spence*, **Multi-Level Weighted Additive Spanners,** *Proceedings of the 19th Symposium on Experimental Algorithms, SEA 2021.* PDF, Conference Version

[C8] Reyan Ahmed*, Faryad Darabi Sahneh, Keaton Hamm, Stephen Kobourov, and Richard Spence*, **Kruskal-based Approximation Algorithm for the Multi-Level Steiner Tree Problem,** *Proceedings of the European Symposium on Algorithms (ESA 2020).* (26.7% acceptance rate) PDF, Conference Version

[C7] Keaton Hamm and Longxiu Huang, **On Column-Row Matrix Approximations,,** *13th International Conference on Sampling Theory and Applications (SampTA 2019), Bordeaux, France,* IEEE. PDF, Conference Version

[C6] Keaton Hamm, Benjamin Hayes, and Armenak Petrosyan*, **Rearranged Fourier Series and Generalizations to Non–Commutative Groups**, *13th International Conference on Sampling Theory and Applications (SampTA 2019), Bordeaux, France,* IEEE. PDF, Conference Version

[C5] Reyan Ahmed*, Mohammad Javad Latifi Jebelli*, Keaton Hamm, Stephen Kobourov, Faryad Darabi Sahneh, and Richard Spence*, **Approximation Algorithms and an Integer Program for Multi-Level Graph Spanners,** *Special Event on Analysis of Experimental Algorithms (S(EA)^2 2019)*, Kalamata, Greece. PDF, Conference Version

[C4] Ali Sekmen, Akram Aldroubi, Ahmet Bugra Koku, and Keaton Hamm, **Principal Coordinate Clustering**, *IEEE International Conference on Big Data 2017*, Boston, MA, 2095-2102. PDF, Conference Version

[C3] Ali Sekmen, Akram Aldroubi, Ahmet Bugra Koku, and Keaton Hamm, **Matrix Reconstruction: Skeleton Decomposition Versus Singular Value Decomposition**, *2017 International Symposium on Performance Evaluation of Computer and Telecommunication Systems* (SPECTS), IEEE, 1-8. PDF, Conference Version

[C2] Keaton Hamm and Jeff Ledford, **On Bases of Cardinal Functions and Their Role in Approximate Sampling Methods**, *12th International Conference on Sampling Theory and Applications (SampTA 2017)*, IEEE, 203-206. PDF, Conference Version

[C1] Keaton Hamm, **Sampling and Recovery Using Multiquadrics**, *11th International Conference on Sampling Theory and Applications (SampTA 2015)*, Washington D.C., IEEE, 124-128. PDF, Conference Version

Other Peer-Reviewed Works

[E1] David Glickenstein, Keaton Hamm, Xiaoming Huo, Yajun Mei, and Martin Stoll, **Editorial: Mathematical Fundamentals of Machine Learning**, *Frontiers in Applied Mathematics and Statistics,* 7:674785, 2021, doi: 10.3389/fams.2021.674785. Journal Version (Open Access)

Dissertation

[0] Keaton Hamm, **On the Interpolation of Smooth Functions via Translates of Radial Basis Functions**. (PhD Dissertation).

A W A R D S

- ⊕ Houston A&M Mother's Club Outstanding Teaching Assistant Award – 2014
  - o Teaching award given yearly to the best 4-6 teaching assistants (out of approximately 150 total T.A.s)
- ⊕ Graduate Teaching Academy Fellow (Texas A&M University) – 2015
  - o Now called Academy for Future Faculty: a program designed to train graduate students and new faculty for teaching excellence. Consisted of a year's worth of weekly seminars on teaching strategies, course development, and best writing practices, as well as classroom observations of faculty.

OTHER ACADEMIC PRODUCTS

- ⊕ [Lecture Notes](#) from an advanced undergraduate/beginning graduate course on Linear Algebra and Data Science.
- ⊕ [GitHub Repo](#) containing code for publications and research projects.

PRESENTATIONS (86)

Colloquia (15)
(All colloquia are 1 hour talks)

Getting More with Less: Matrix and Tensor Algorithms from Subsampling Modes – Colloquium, Northern Illinois University Department of Mathematical Sciences, 3 November 2023.

Optimal Transport Based Manifold Learning – Colloquium, Colorado School of Mines Department of Applied Mathematics and Statistics, 21 April 2023.

Rearrangements of Fourier Series – Colloquium, University of Texas at Arlington Department of Mathematics, 23 October, 2020.

Structures in Data – Colloquium, Boise State University, 30 January, 2020.

Structures in Data – Colloquium, University of Texas at Dallas, 27 January, 2020.

Structures in Data – Colloquium, University of Texas at San Antonio, 5 December, 2019.

Structured Approximation of Data – Colloquium, University of Texas at Arlington, 18 November, 2019.

Column Selection Methods and Subspace Clustering – Applied Math Colloquium, UCLA, 23 October, 2019.

Rearrangements of Fourier Series and Extensions – Colloquium, Texas Christian University (TCU), Fort Worth, TX, 20 September, 2019.

Dimension Reduction, Matrix Factorizations, and Clustering Algorithms – Colloquium, University of North Texas, Denton TX, 18 February, 2019.

Dimension Reduction, Matrix Factorizations, and Subspace Clustering Algorithms – Colloquium, New Mexico State University, Las Cruces, NM, 12 October, 2018.

Data Clustering Algorithms – Colloquium, Texas A&M Corpus Christi, Corpus Christi, TX, 6 April, 2018.

Data Clustering Algorithms – Colloquium, University of San Francisco, San Francisco, CA, 29 January, 2018.

Data Clustering Algorithms – Millican Colloquium, University of North Texas, Denton, TX, 20 November, 2017.

Data Clustering Algorithms – Colloquium, University of Oklahoma, Norman, OK, 2 November, 2017.

Mini-Courses (2)

Mini-Course on Dimensionality Reduction and Manifold Learning (3 hours) – Workshop in Harmonic Analysis, Sampling Theory, Machine Learning, and Data Science, Universidad de Buenos Aires, Buenos Aires, Argentina, Nov 21-25, 2022.
        Part 1: Linear Dimensionality Reduction
        Part 2: Nonlinear Dimensionality Reduction and Manifold Learning

Mini-Course on Dimensionality Reduction (2 hours) – CIMAT/TRIPODS Workshop, CIMAT, Guanajuato, Mexico, 6-7 January, 2020.
        Part 1: *Deterministic Dimensionality Reduction.*
        Part 2: *Randomized Dimensionality Reduction*

Invited Seminar and Conference Talks (59)

(Upcoming) Structured Approximations in Wasserstein Space (30 min) – Minisymposium on Measure Transport - Algorithms and Analysis, SIAM Computational Science and Engineering 2025 (CSE25), Fort Worth, TX, March 3-7, 2025.

(Upcoming) Manifold Learning in Wasserstein Space (30 min) – SIAM Conference on Mathematics of Data Science (MDS24), Atlanta, GA, Oct 21-25, 2024.

(Upcoming) Manifold Learning in Wasserstein Space (30 min) – Minisymposium on Geometric and Topological Approaches in Data Science and Machine Learning, SIAM TX-LA Sectional Meeting, Waco, TX, Oct 11-13, 2024.

Manifold Learning in Wasserstein Space (1 hr) – Codes and Expansions (CodEX) Seminar, Online, Sept 17, 2024.

Manifold Learning in Wasserstein Space (30 min) – Special session on Machine Learning,

Data Science, and Related Fields, Fall Central AMS Sectional Meeting, San Antonio, TX, Sept 14-15, 2024.

Getting More with Less: Matrix and Tensor Algorithms from Subsampling Modes (1 hr) – Algorithms Seminar, Department of Statistics, Warwick University, Warwick, UK, May 24, 2024.

Using the Nyström Method for Faster Manifold Learning in Wasserstein Space (30 min) – SIAM Conference on Linear Algebra (LA24), Paris, France, May 13-17, 2024.

Tensor decompositions by mode subsampling (1 hr) – 1 World Mathematics of Information, Data, and Signals (MINDS) Seminar, University of California San Diego (simulcast virtually: [Video](#)), San Diego, CA, April 18, 2024.

Python for Data Science (15 min) – Climate Smart Agriculture Student Symposium, Texas A&M University Kingsville, Kingsville, TX, March 25, 2024.

Linearized Optimal Transport for Manifold Learning in Wasserstein Space (30 min) – Special Session on Geometry and Symmetry in Data Science, AMS Spring Southeastern Sectional Meeting, Tallahassee, FL, March 24, 2024.

Manifold Learning in Wasserstein Space (1 hr) – 1 World Mathematics of Machine Learning (Virtual: [Video](#)), Feb 7, 2024.

Getting More with Less: Matrix and Tensor Algorithms from Subsampling Modes (30 min)– Special Session on Sparse Signal Learning and Its Applications in Data Science, 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Wilmington, NC, May 31 - June 4, 2023.

Wasserstein Isometric Mapping (30 min) – International Conference on Approximation Theory and Beyond, Nashville, TN, May 15-18, 2023

Python Resources for Climate Smart Agriculture (15 min) – Climate Smart Agriculture Student Symposium, University of Texas at Arlington, Arlington, TX, May 2023.

Optimal Transport and Manifold Learning – Workshop on Optimal Transport in Data Science, ICERM, Providence, RI, May 8-12, 2023.

Optimal Transport Based Manifold Learning (1 hour) – Joint IDA (Inverse Problems/Data Sciences/Applied Math) Seminar, Colorado State University, Fort Collins, CO, April 27, 2023.

Wasserstein Isometric Mapping (30 min) – Special session on Harmonic Analysis and its Applications to Signals and Information, AMS Spring Central Sectional Meeting, Cincinnati, OH, April 15, 2023.

Wassmap: Wasserstein Isometric Mapping for Image Manifold Learning (1 hour) – Seminar on Integrable Systems and Nonlinear Mechanics, UT Rio Grande Valley and TAMU Corpus Christi joint seminar (Virtual presentation), March 21, 2023.

Getting More with Less: Matrix and Tensor Algorithms from Subsampling Modes (1 hour) – Do NASK Seminar, NASK (Naukowa i Akademicka Sieć Komputerowa – National Academy of Computer Science), Warsaw, Poland, 1 March, 2023.

Wassmap: Wasserstein Isometric Mapping for Image Manifold Learning (1 hour) – Department of

Statistical Science Seminar, Southern Methodist University (SMU), Dallas, TX, 24, February 2023.

Getting More with Less: Matrix and Tensor Algorithms from Subsampling Modes (30 min) – Special session on Mathematics of Information, Pacific Rim Mathematical Association (PRIMA) Congress, Vancouver, British Columbia, Canada, Dec 6, 2022.

Modewise Tensor Decompositions and Applications (30 min) – Minisymposium on Tensor Modeling and Applications, SIAM TX-LA Section Meeting, Houston, TX Nov 5, 2022.

Wassmap: Wasserstein Isometric Mapping for Image Manifold Learning (30 min) – Minisymposium on Optimal Transport, Manifold Learning, and Dimensionality Reduction, SIAM Mathematics of Data Science 2022, San Diego, CA Sept 30, 2022.

What the heck is a CUR decomposition? (1 hour) – Working Group on Tensor Factorizations and Applications, Harvey Mudd College, Claremont, CA, August 2, 2022.

Python for Data Science (20 min) – USDA ARS—UTA Research Apprenticeship program, June 2022.

Wasserstein Isometric Mapping and Image Manifold Learning (30 min) – Workshop on PDE Methods in Data Science and Machine Learning, in Focus Program on Data Science, Approximation Theory, and Harmonic Analysis, Fields Institute, Toronto, Ontario, Canada, 2 June, 2022.

Interpolation in Quasi-Shift Invariant Spaces (20 min) – Special Session on Frame Theory and Applications, Joint Mathematics Meeting (JMM) Virtual, April 8, 2022.

Optimal Transport Methods in Nonlinear Dimensionality Reduction (30 min)– SIAM Southeastern Atlantic Section Conference, Auburn, AL, 18 September, 2021.

Dimensionality Reducing Embeddings using Wasserstein distances (1 hour)– Banach and Metric Spaces Seminar, Texas A&M University, College Station, TX, September, 2021.

Column Subset Selection and You (1 hour)– Codes and Expansions (CodEX) Seminar, Online, 9 March, 2021. (Virtual: [Video](#))

The Subspace Clustering Problem – Research Training Group on Data-Oriented Mathematical and Statistical Sciences, Arizona State University, Tempe, AZ, 30 March, 2020. (Given online due to Covid-19)

Structure in Data – Brown Bag U.S. Air Force Academy, Colorado Springs, CO, 24 January, 2020.

Wasserstein ISOMAP for Image Manifold Learning – Joint Mathematics Meetings, AMS Special Session on Group Actions in Harmonic Analysis, Denver, CO, 15 January, 2020.

Wasserstein ISOMAP for Image Manifold Learning – CIMAT/TRIPODS Workshop, Guanajuato, Mexico, 7 January, 2020.

CUR Decompositions and Subspace Clustering – Applied Math Seminar, University of Texas at Arlington, Arlington, TX, 27 September, 2019.

CUR Decompositions and Subspace Clustering – Applied Math Seminar, University of Texas at Dallas, Richardson, TX, 20 September, 2019.

Multi-Level Graph Sketches – Special Session on Recent Trends of Mathematics of Data, AMS Fall Central Sectional Meeting, Madison, WI, 14-15 September, 2019.

CUR Decompositions – Analysis and Applications Seminar, University of Arizona, Tucson AZ, 19 March, 2019.

CUR Decompositions and Applications – Special Session on Applied Harmonic Analysis: Frame Theory and Applications, AMS Fall Western Sectional Meeting, San Francisco, CA, 27-28 October, 2018.

CUR Decompositions and the Subspace Clustering Problem – Special Session on Extensions-Interpolation-Shape Matching in $\mathbb{R}^d$, Symmetry-Invariance, Algorithms and Related Topics, AMS Fall Central Sectional Meeting, Ann Arbor, MI, 20-21 October, 2018.

Dimension Reduction, Matrix Factorizations, and Clustering Algorithms – TRIPODS Seminar, University of Arizona, Tucson, AZ, 24 September, 2018.

On Rearrangements of Fourier Series – ICERM Topical Workshop on Frame Theory and Exponential Bases, Providence, RI, 4-8 June, 2018. [Video of Talk]

CUR Matrix Decomposition and Subspace Clustering – AMS Special Session on Interactions of Inverse Problems, Signal Processing, and Imaging, I, Joint Mathematics Meeting, San Diego, CA, 10-13 January, 2018.

CUR Matrix Decomposition and Subspace Segmentation – Special Session on Applied Harmonic Analysis: Frames, Samplings, and Applications, AMS Fall Southeastern Sectional Meeting, Orlando, FL, 23 September, 2017.

Approximation and Quasi Shift-Invariant Spaces – Special Session on Banach Spaces and Applications, AMS Fall Central Sectional Meeting, Denton, TX, 9 September, 2017.

CUR Matrix Decomposition and Subspace Segmentation – Seminar on Applied Mathematics, Hong Kong University of Science and Technology, Kowloon, Hong Kong, 19 August, 2017.

On Bases of Cardinal Functions and Their Role in Approximate Sampling Methods – 12th International Conference on Sampling Theory and Applications (SampTA 2017), Tallin, Estonia, 7 July, 2017.

Gabor Frames of Cardinal Functions – AMS Special Session on Frame Theory, AMS Spring Southeastern Sectional Meeting, Charleston, SC, 12 Mar, 2017.

Structure and Function Interpolation in Quasi Shift-Invariant Spaces – Analysis, Logic and Physics Seminar, Virginia Commonwealth University, Richmond, VA, 3 Mar, 2017.

Interpolation in Shifted Function Spaces – AMS Session on Topics in Analysis II, Joint Mathematics Meetings, Atlanta, GA, 6 Jan, 2017.

Interpolation in Shifted Function Spaces – AMS Special Session on Bases in Function Spaces: Sampling, Interpolation, Expansions and Approximations, Joint Mathematics Meetings, Atlanta, GA, 4 Jan, 2017.

Sampling on Lattices via Radial Basis Functions – 15th International Conference on Approximation Theory, San Antonio, TX, 25 May, 2016.

Sampling and Interpolation with Radial Basis Functions – Computational Analysis Seminar, Vanderbilt University, 9 September, 2015.

Convergence Rates for Cardinal Interpolation Using Multiquadrics – Workshop in Analysis and Probability Seminar, Texas A&M University, 15 July, 2015.

Riesz Bases of Exponentials and Connections with Multivariate Interpolation – Joint Banach Spaces and Approximation Theory Seminar, Texas A&M University, 1 May, 2015.

Sampling and Recovery of Bandlimited Functions – Graduate Student Organization Seminar, Texas A&M University, 12 March, 2015

Approximation Rates for Scattered-data Interpolation via Gaussians – AMS Session on Topics in Analysis II, Joint Mathematics Meetings, San Antonio, TX, 13 Jan, 2015.

Approximation Rates for Scattered-data Interpolation via Gaussians – Special Session on Harmonic Analysis and its Applications, AMS Sectional Meeting, Albuquerque, NM, 5 April, 2014.

Approximation Rates for Scattered-data Interpolation via Gaussians – Joint Banach Spaces and Approximation Theory Seminar, Texas A&M University, 22 November, 2013.

Contributed Talks and Posters (10)

CUR Decompositions and Motion Segmentation – International Congress on Industrial and Applied Mathematics (ICIAM 2019, Poster Session), Valencia, Spain, July 2019.

On Column-Row Matrix Factorizations – 13th International Conference on Sampling Theory and Applications (SampTA 2019, Poster Session), Bordeaux, France, July 2019.

CUR Decompositions and Motion Segmentation – ICERM Workshop on Optimization Methods in Computer Vision and Image Processing (Poster Session), Providence, RI, 1 May, 2019.

Rearrangements of Fourier Series – February Fourier Talks (Poster Session), University of Maryland, 21 February, 2019.

CUR Decompositions and Subspace Clustering – 2nd International Conference on Mathematics of Data Science, Norfolk, VA, 2-4 November, 2018.

On Rearrangements of Fourier Series – 34th Southeastern Analysis Meeting (SEAM), Georgia Institute of Technology, Atlanta, GA, 23-25 Mar, 2018.

Regular Families of Kernels for Nonlinear Approximation – 7th Ohio River Analysis Meeting (ORAM), University of Cincinnati, Cincinnati, OH, 26 Mar, 2017.

Regular Families of Kernels for Nonlinear Approximation – 33rd Southeastern Analysis Meeting (SEAM), University of Tennessee, Knoxville, TN, 18 Mar, 2017.

Regular Families of Kernels for Nonlinear Approximation – February Fourier Talks (Poster Session), University of Maryland, 16 Feb, 2017.

Sampling and Recovery Using Multiquadrics – 11th International Conference on Sampling Theory and Applications (SampTA 2015), Washington D.C., 25 May, 2015.

TEACHING EXPERIENCE

UNIVERSITY OF TEXAS AT ARLINGTON

(My teaching load pre-tenure at UTA is 2 courses per academic year)

Instructor of Record

(DATA = Bachelors of Science in Data Science)

MATH 3330, Linear Algebra – Fall 2023
DATA 3401, Python for Data Science 1 – Fall 2021, Spring 2022, Fall 2022
MATH 6310, Foundations of Data Science – Fall 2020, Fall 2022, Fall 2024
MATH 4381, Mathematics Research – Summer 2021
MATH 5399/5699/5999, Research in Mathematics – Spring 2021, Fall 2021, Fall 2022, Spring
       2023, Fall 2023, Spring 2024, Summer 2024

Course Design

(ASDS = Masters of Science in Applied Statistics and Data Science)

ASDS 5302, Principles of Data Science
ASDS 5303, Statistical and Scientific Computing I
ASDS 6305, Statistical and Scientific Computing II

Capstone Project Supervision

Students in DATA 4381 and 4382

- ⊕ Phuong Trinh – "Optimal transport based dimensionality reduction for supervised learning" – Fall 2023 – Fall 2024
- ⊕ Ryan Bui – "Optimal transport based dimensionality reduction for unsupervised learning" – Fall 2023 – Fall 2024
- ⊕ Khoa Truong – "Machine Learning models for predicting housing prices in DFW" – Fall 2022 – Spring 2023

Honors Contract Supervision

UTA allows students to do Honors contracts for any class under the instructor's supervision. Below are students who successfully completed their honors contract for one of my courses with their project titles, course number, and semester.

- ⊕ Kaylea Hollenbach – Applications of Linear Algebra in Special Relativity, MATH 3330 Introduction to Linear Algebra and Vector Spaces, Fall 2024

- ⊕ Joshua Mullins – Advanced Problems in Linear Algebra, MATH 3330 Introduction to Linear Algebra and Vector Spaces, Fall 2024
- ⊕ Shashwat Dhayade – A Python Blackjack simulator, DATA 3401 Python for Data Science I, Spring 2022

UNIVERSITY OF ARIZONA

(My teaching load as a postdoc at University of Arizona was 1 course per academic year)

Instructor of Record

MATH 496T/577, Advanced Linear Algebra for Data Science – Spring 2020
- ⊕ This course was continued and later became a regular elective course in the Math department after I left.

MATH REU (research on Monte-Carlo Tree Search, co-supervised with Kwang-Sun Jun (Computer Science)) – Spring 2020
MATH REU (research on Subspace Clustering) – Fall 2019 – Summer 2020
MATH 492, Undergraduate Research – Fall 2019
MATH 129, Calculus II – Fall 2018

VANDERBILT UNIVERSITY

(My teaching load as a postdoc at Vanderbilt was 4 courses per academic year)

Instructor of Record

MATH 3620/5620, Introduction to Numerical Mathematics – Spring 2018
MATH 3100, Introduction to Analysis – Fall 2017
MATH 2420, Methods of Ordinary Differential Equations – Spring 2017
MATH 2300, Multivariable Calculus – Fall 2015
MATH 1301, Accelerated Single-Variable Calculus II – Fall 2017
MATH 1300, Accelerated Single-Variable Calculus I – Fall 2016
MATH 1011, Introduction to Probability and Statistical Inference II – Spring 2016, 2017

Teaching Assistant

MATH 1300, Accelerated Single-Variable Calculus I – Fall 2015, Spring 2016

Other
Reading course on Mathematical Signal Processing – Spring 2016

TEXAS A&M UNIVERSITY

Instructor of Record

MATH 131, Math Concepts - Calculus – Summer 2014

Teaching Assistant

MATH 150, Functions – Spring 2011
MATH 151, Engineering Calculus I – Fall 2011, Fall 2013
MATH 152, Engineering Calculus II – Spring 2012, Spring 2014
MATH 409, Advanced Calculus I – Summer 2012 (online course)
MATH 411, Mathematical Probability – Spring 2013
MATH 437, Principles of Numerical Analysis, Fall 2014
MATH 446, Principles of Analysis I – Fall 2012
MATH 601, Methods of Applied Mathematics I – Fall 2010
MATH 664, Quantum Computation and Quantum Information – Summer 2015

RESEARCH SUPERVISION

UNIVERSITY OF TEXAS AT ARLINGTON

Postdoctoral Researchers

- Shujie Kang (PhD from University of Maryland) – 2020-2022
  - o Now works at Goldman Sachs

PhD Students

- Christopher Eads – Optimal Transport and Manifold Learning – Fall 2022-present (on leave in Spring and Fall 2024). Expected graduation: Spring 2026.

- Muhammad Rana – Deep Learning – Spring 2021-present (on leave academic year 2021-2022). Expected graduation: Spring or Fall 2025.

- Mohamed Meskini – Robust PCA – Fall 2021-2023 (stopped degree progress in Spring 2023 due to health concerns).

Masters Students

- Marcus Hawkins – Manifold Learning in Robotics (joint with William Beksi, CSE) – Fall 2022-Spring 2024. Graduated Spring 2024.

Undergraduate Students

- Christopher Moorehead – Robust PCA – Summer 2021. Graduated Spring 2022.

- Jason Bard – Machine Learning for Self-driving Tractors – USDA ARS Intern program Summer 2022
    - Jason is now a PhD student in the UTA Math department

Member of Dissertation Committees (non-advisor role)

- Zachary Chairez (Mathematics) – 2022-2024
- Quan Nguyen (Computer Science and Engineering) – 2021-present
- Khitam Aqel (Mathematics) – 2024-present
- Zahra Asiri (Mathematics) – 2024-present

UNIVERSITY OF ARIZONA

Graduate Students

- Zhaoying Lu – Boosting Nyström Method – 2021-2023
- Wenbo Ouyang – Ensemble CUR Decompositions – 2021-2023

Undergraduate Students

- Hari Krishnan – Active Learning and Monte Carlo Tree Search (joint with Kwang-Sung Jun – Computer Science) – 2020-2022
- Eva Huie -- Matrix Factorizations for Subspace Clustering – Fall 2019
- Reeshad Arian – Matrix Factorizations for Subspace Clustering – 2019-2021
- Former Student Mentor to an undergraduate mathematics student at Texas A&M – Fall 2012—Fall 2013.

SERVICE (RESEARCH COMMUNITY)

Editorial Work

- Co-Editor and Organizer (with David Glickenstein, Xiaoming Huo, Yajun Mei, and Martin Stoll) of a [Special Issue on Mathematical Fundamentals of Machine Learning](#) in *Frontiers in Applied Mathematics and Statistics – Mathematics of Data Science Section* (2020-2021).

Conference Organization

- (Upcoming) Lead Organizer of the Minisymposium on Structure in Data: Theory, Learning, and Algorithms at SIAM Conference on Mathematics of Data Science (MDS24) Atlanta, GA Oct 2024.

- Lead Organizer (with Steven Damelin) of the Minisymposium on Optimal Transport, Manifold Learning, and Dimensionality Reduction at the SIAM Conference on Mathematics of Data Science (MDS22), San Diego, CA Sept 2022.

- Co-organizer (with Akram Aldroubi, Javad Mashreghi, and Armenak Petrosyan) of the Workshop on the Interaction between Data Science, Approximation Theory, and Harmonic Analysis, (Fields Institute, Toronto, Canada, 4 weeks May-June 2022).

- Lead organizer (with HanQin Cai and Longxiu Huang) of the Minisymposium on Computational Linear Algebra in Data Science at the SIAM Conference on Computational Science and Engineering (CSE21), March 1-5, 2021 (Online due to Covid-19).

- Lead organizer (with Faryad Sahneh, Vahan Huroyan, Raymundo Navarrete, and Brooke Valmont) of the TRIPODS Southwestern Summer Conference on Data Science, University of Arizona, May 2019.

- Co-organizer (with Akram Aldroubi and Alex Powell) of the 33rd Annual Shanks Conference and Lecture in conjunction with the International Conference on Computational Harmonic Analysis and Applications, Vanderbilt University, May 14-18, 2018.

- Co-organizer (with Alex Powell) of a Birthday Workshop in honor of Akram Aldroubi's 60th birthday, Vanderbilt University, May 19, 2018.

- Co-organizer (with Akram Aldroubi, Michael Northington V, and Alex Powell) of the Special Session on Harmonic Analysis, Functional Analysis, and Their Applications, Spring Southeastern AMS Sectional Meeting, Vanderbilt University, April 14-15, 2018.

- Co-organizer (with Sui Tang) of a Minisymposium on Approximation Theory in Signal Processing at the 15th International Conference on Approximation Theory, San Antonio, TX, May 22-25, 2016.

Referee Work

- NSF Panelist – 2021

- Journal Reviewer – I review about 8 papers per year on average for various journals and conferences. Below is a list of venues I have reviewed for with varying frequency.

  o *Applied and Computational Harmonic Analysis*

  o *Proceedings of the American Mathematical Society*

  o *PLOS One*

  o *SIAM Journal on Mathematics of Data Science*

  o *SIAM Journal on Matrix Analysis and Applications (~2-3 papers per year)*

- *IMA Journal of Numerical Analysis*
- *IEEE Transactions on Signal Processing*
- *BIT Numerical Mathematics*
- *Journal of Fourier Analysis and Applications*
- *Linear Algebra and its Applications*
- *Journal of Approximation Theory*
- *Advances in Computational Mathematics*
- *Journal of Computational and Applied Mathematics (~2 papers per year)*
- *Canadian Mathematical Bulletin*
- *Analysis Mathematica*
- *Advances in Computational Analysis*
- *Journal of Mathematical Analysis and Applications*
- *Banach Journal of Mathematical Analysis*
- *Journal of Computational and Applied Mathematics*
- *Numerical Functional Analysis and Applications*
- *Science China Mathematics*
- *Results in Applied Mathematics*
- *Sampling Theory in Signal and Image Processing*
- *IEEE Pacific Visualization Conference Proceedings*
- *SampTA Conference Proceedings*
- *SIAM Undergraduate Research Online*

- Book reviewer (giving initial feedback on scope and suitability of draft textbooks for publishers) – reviewed approximately 6 potential books in 2020-2024 for a variety of publishers.

SERVICE (LOCAL COMMUNITY)

University Service

- AI Cluster Hire search committee (RISE 100 cluster hire) – August 2024-Spring 2025.
- Organizer of Machine Learning Reading Group (with members from the Colleges of Science and Engineering) – Jan 2021-May 2021.

College Service

- ⊞ Mathematics Department Chair Review Committee – April 2024-May 2024.
- ⊞ Design and Proposal Committee for PhD in Data Science (under Division of Data Science) – Nov 2023-March 2025.
- ⊞ Executive Board member for the Division of Data Science (UTA College of Science) – Jan 2024-present.
- ⊞ Executive Committee for the Center for Data Science Research and Education (CDSRE) – Jan 2023-Dec 2023. (The Center was absorbed into the Division of Data Science)
- ⊞ MS Applied Statistics and Data Science Curriculum Committee Member – May 2023-present.
- ⊞ Data Science Undergraduate Curriculum Committee Chair – Fall 2020-present.
- ⊞ Design and Proposal Committee for Masters degree in Applied Statistics and Data Science (MS ASDS) – May 2021-May 2023.
- ⊞ Design and Proposal Committee for 4+1 Bachelors Data Science to MS ASDS Track – May 2022-May 2024.
- ⊞ College of Science NTT Hiring committee (twice in 2020-2024)
- ⊞ College of Science Associate/Full Professor Hiring committee (2022)
- ⊞ Division of Data Science Academic Advisor Hiring committee (Jan 2024)
- ⊞ Data Science TA Hiring committee (twice in 2020-2023)
- ⊞ Data Science Technology Committee Member – Fall 2020-Fall 2023.

Departmental Service

- ⊞ Mathematics Assistant Professor Hiring committee (Oct 2023-March 2024)
- ⊞ MATH Awards and Public Relations Committee – May 2021-April 2025.
- ⊞ MATH Graduate Affairs Committee (GAC) – Sept 2021-Aug 2022.
- ⊞ MATH Prelim A Committee Member – December 2020-present.
- ⊞ MATH Prelim A Committee Chair – January 2023.
- ⊞ MATH Prelim proctor (2 times)
- ⊞ MATH Prelim grader (3 times)

Prior to UTA

- ⊞ Organizer of Research Working Group 2 (Visualization and Machine Learning) in the UA TRIPODS Program – Fall 2019—Spring 2020.
- ⊞ Organizer of Research Working Group 3 (Imaging) in the UA TRIPODS Program – Spring 2018—Spring 2020.

- ⊕ Co-organizer of the TRIPODS Seminar at University of Arizona – Fall 2018—Spring 2020.

- ⊕ Website maintenance for the UA TRIPODS Website – Fall 2018—Spring 2020.

- ⊕ Organizer of the Computational Analysis Seminar at Vanderbilt University – Fall 2016—Spring 2018.

- ⊕ Served on a panel for advice from graduating students on navigating the job market at Texas A&M– Spring 2015.

- ⊕ Organized (and gave weekly lectures in) an informal working seminar on Fourier analysis and function interpolation at Texas A&M – Fall 2014.

- ⊕ Took part in a panel of graduate students on selecting an advisor for the "First Semester Graduate Students Seminar" – Fall 2013.

OUTREACH

- ⊕ Guest lecture on Optimal Transport in Machine Learning – DATA 4381 Data Science Capstone I – Fall 2023.

- ⊕ Speaker – Voices Live Podcast at UTA Science Week – April 2022. [Recording](#)
- ⊕ Guest lecture on Manifold Learning – DATA 4381 Data Science Capstone I – Fall 2023
- ⊕ Guest lecture on Structure in Data – DATA 4380 Data Problems – Spring 2022
- ⊕ Guest speaker on Structure in High-dimensional Data for MAA Seminar at UTA – Spring 2021.
- ⊕ Co-leader of the [Machine Learning Literacy Project](#) at University of Arizona – a Hackathon to teach undergraduates basics of Machine Learning and give student groups the chance to give Lightening Talks about ML uses in their major (Fall 2019—Spring 2020).
- ⊕ Panelist for Q&A Session on AI and Machine Learning for PenguinAI.py, the Tucson, AZ University High School AI Club – Dec. 2019.
- ⊕ Research mini-talk on signal processing for an REU at Texas A&M – Summer 2014.

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

American Mathematical Society
Society for Industrial and Applied Mathematics

OTHER SKILLS

Languages:

Spanish – Reading, writing, and conversational speaking
Matlab – Proficient
Python – Proficient