Vince Lyzinski

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Academic Appointments

08/21–present **Associate Professor**, *University of Maryland, College Park*, Department of Mathematics.

- Additional Affiliation in the Applied Mathematics and Scientific Computation Program (AMSC), University of Maryland, College Park, 12/19–present

08/19–08/21 **Assistant Professor**, *University of Maryland, College Park*, Department of Mathematics.

09/17–08/19 **Assistant Professor**, *University of Massachusetts, Amherst*, Department of Mathematics and Statistics.

08/14–08/17 **Senior Research Scientist**, *Johns Hopkins University*, The Human Language Technology Center of Excellence.

08/14–08/20 **Assistant Research Professor**, *Johns Hopkins University*, Department of Applied Mathematics and Statistics.

01/13–08/14 **Postdoctoral Fellow**, *Johns Hopkins University*, Department of Applied Mathematics and Statistics (supervisor: Prof. Carey E. Priebe).

Other Employment

Summer 2012 **Graduate Advisor**, East Tennessee State University Research Experience for Undergraduates (REU) under Prof. Anant Godbole.

Educational Background

05/13 **Ph.D.**, *Johns Hopkins University*, Applied Mathematics and Statistics.

Advisor: Prof. James Allen Fill

Dissertation title: Intertwinings, Interlacing Eigenvalues, and Strong Stationary Duality for Diffusions

12/11 **M.S.E.**, *Johns Hopkins University*, Applied Mathematics and Statistics.

05/07 **M.A.**, *Johns Hopkins University*, Mathematics.

05/06 **B.S.**, *University of Notre Dame*, Mathematics, Magna Cum Laude.

Studied abroad via the Budapest Semesters in Mathematics, Spring 2005 semester.

Professional Society Memberships

Member: ASA, IMS, Phi Beta Kappa

Research Publications

Students advised or co-advised <u>are underlined</u>; Postdocs mentored indicated with *.

Refereed Journal Publications

2023.

[43] Z. Li, J. Arroyo*, K.Pantazis, **V. Lyzinski**, "Clustered Graph Matching for Label Recovery and Graph Classification," IEEE Transactions on Network Science and Engineering, 10, no. 6:3384-3395, 2023.

[42] A.-F. M. Al-Qadhi, C. E. Priebe, H. S. Helm, and **V. Lyzinski**, "Subgraph nomination: Query by Example Subgraph Retrieval in Networks," Statistics and Computing, 33, no. 2, 2023.

[41] A. Athreya, Z. Lubberts, C. E. Priebe, Y. Park, M. Tang, **V. Lyzinski**, M. Kane, B. W. Lewis, "Numerical Tolerance for Spectral Decompositions of Random Matrices and Applications to Network Inference," Journal of Computational and Graphical Statistics, 32:1, 145-156, 2023.

2022.

[40] J. Milzman, **V. Lyzinski**, "Signed and Unsigned Partial Information Decompositions of Continuous Network Interactions," Journal of Complex Networks Volume 10, Issue 5, October 2022, cnac026, 2022.

[39] K. Pantazis, A. Athreya, J. Arroyo*, W. N. Frost, E. S. Hill, **V. Lyzinski**, "The Importance of Being Correlated: Implications of Dependence in Joint Spectral Inference across Multiple Networks," Journal of Machine Learning Research, 23, no. 141: 1-77, 2022.

[38] K. Pantazis, D. L. Sussman, Z. Li, Y. Park, C. E. Priebe, **V. Lyzinski**, "Multiplex graph matching matched filters," Applied Network Science, 7, Article number 29, 2022.

[37] R. Zheng, **V. Lyzinski**, C. E. Priebe, and M. Tang, "Vertex nomination between graphs via spectral embedding and quadratic programming," Journal of Computational and Graphical Statistics, 31:4, 1254-1268, DOI: 10.1080/10618600.2022.2060238, 2022.

2021.

[36] D. E. Fishkind, F. Parker, H. Sawczuk, L. Meng, E. Bridgeford, A. Athreya, C. E. Priebe, and **V. Lyzinski**, "The Phantom Alignment Strength Conjecture: Practical use of graph matching alignment strength to indicate a meaningful graph match," (previous title was "On Phantom Alignment Strength"), Applied Network Science, 6, Article number: 62, 2021

[35] J. Arroyo*, C. E. Priebe, **V. Lyzinski**, "Graph matching between bipartite and unipartite networks: to collapse, or not to collapse, that is the question," IEEE Transactions on Network Science and Engineering, Volume: 8, Issue: 4, Oct.-Dec. 1, 2021.

[34] D. E. Fishkind, A. Athreya, L. Meng, **V. Lyzinski**, C. E. Priebe, "On a complete and sufficient statistic for the correlated Bernoulli random graph model," Electronic Journal of Statistics, 15.1: 2336-2359, 2021.

[33] J. Arroyo*, D. L. Sussman, C. E. Priebe, **V. Lyzinski**, "Maximum likelihood estimation and graph matching in errorfully observed networks," Journal of Computational and Graphical Statistics, 30(4), 1111-1123, 2021.

2020.

[32] J. Agterberg, Y. Park, J. Larson, C. White, C. E. Priebe, **V. Lyzinski**, "Vertex Nomination, Consistent Estimation, and Adversarial Modification," Electronic Journal of Statistics, Vol. 14, No. 2, pp. 3230-3267, 2020.

[31] H.G. Patsolic, Y. Park, **V. Lyzinski**, C.E. Priebe, "Vertex Nomination Via Seeded Graph Matching," Statistical Analysis and Data Mining, Vol. 13.3, pp. 229-244, 2020.

[30] J. Yoder, L. Chen, H. Pao, E. Bridgeford, K. Levin, D. E. Fishkind, C. E. Priebe, **V. Lyzinski**, "Vertex nomination: The canonical sampling and the extended spectral nomination schemes," Computational Statistics & Data Analysis, Vol. 145, 106916, 2020.

[29] **V. Lyzinski** , D. L. Sussman, "Matchability of heterogeneous networks pairs," , Information and Inference: A Journal of the IMA, Vol. 9.4, pp. 749-783, 2020.

[28] D. L. Sussman, Y. Park, C. E. Priebe, **V. Lyzinski**, "Matched filters for noisy induced subgraph detection," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 42, no. 11, pp. 2887-2900, 2020.

2019.

[27] D. E. Fishkind, L. Meng, A. Sun, C. E. Priebe, **V. Lyzinski**, "Alignment strength and correlation for graphs," Pattern Recognition Letters, 125, pp. 203–215, 2019.

[26] C. E. Priebe, Y. Park, J. T. Vogelstein, J. M . Conroy, **V. Lyzinski**, M. Tang, A. Athreya, J. Cape, E. Bridgeford: "On a 'Two-Truths' Phenomenon in Spectral Graph Clustering," Proceedings of the National Academy of Sciences, 116.13, pp. 5995-6000, 2019.

[25] **V. Lyzinski**, K. Levin, C.E. Priebe, "On Consistent Vertex Nomination Schemes," Journal of Machine Learning Research, no. 69, pp. 1-39, 2019.

[24] P. Rastogi, A. Poliak, **V. Lyzinski**, and B. Van Durme, "Neural Variational Entity Set Expansion for Automatically Populated Knowledge Graphs," Information Retrieval Journal, 22.3-4, pp. 232-255, 2019.

[23] D.E. Fishkind, S. Adali, H.G. Patsolic, L. Meng, D. Singh, **V. Lyzinski**, C.E. Priebe, "Seeded Graph Matching," Pattern Recognition, Vol. 87, pp. 203-215, 2019.

2018.

[22] **V. Lyzinski**, "Information Recovery in Shuffled Graphs via Graph Matching," IEEE Transactions on Information Theory, Vol. 64 no. 5, pp.3254-3273, 2018.

[21] A. Athreya, D.E. Fishkind, K. Levin, **V. Lyzinski**, Y. Park, Y. Qin, D.L. Sussman, M. Tang, J.T. Vogelstein, C.E. Priebe,"Statistical inference on random dot product graphs: a survey," Journal of Machine Learning Research, Vol. 18, pp. 1-92, 2018.

2017.

[20] A. Jansen, G. Sell, **V. Lyzinski**, "Scalable Out-of-Sample Extension of Graph Embeddings Using Deep Neural Networks," Pattern Recognition Letters, Vol. 94 no. 15, pp. 1-6, 2017.

[19] **V. Lyzinski**, Y. Park, C. E. Priebe, Michael Trosset, "Fast Embedding for JOFC Using the Raw Stress Criterion," Journal of Computational and Graphical Statistics, 26.4, pp. 786-802, 2017.

[18] M. Tang, A. Athreya, D. L. Sussman, **V. Lyzinski**, C. E. Priebe, "A Semiparametric Two-sample Hypothesis Testing Problem for Random Dot Product Graphs," Journal of Computational and Graphical Statistics, 26(2), 344-354, 2017.

[17] M. Tang, A. Athreya, D. L. Sussman, **V. Lyzinski**, C. E. Priebe, "A Nonparametric Two-sample Hypothesis Testing Problem for Random Dot Product Graphs," Bernoulli Journal, Vol. 23 no. 3, 1599-1630, 2017.

[16] K. Levin and **V. Lyzinski**, "Laplacian Eigenmaps from Sparse, Noisy Similarity Measurements," IEEE Transactions on Signal Processing, Vol. 65 no. 8, 2017.

[15] D. Zheng, D. Mhembere, **V. Lyzinski**, J. Vogelstein, C. E. Priebe, R. Burns, "Semi-External Memory Sparse Matrix Multiplication on Billion-node Graphs in a Multicore Architecture," IEEE Transactions in Parallel and Distributed Systems, Vol. 28 no. 5, pp 1470-1483, 2017.

[14] **V. Lyzinski**, M. Tang, A. Athreya, Y. Park, C. E. Priebe, "Community Detection and Classification in Hierarchical Stochastic Blockmodels," IEEE Transactions on Network Science and Engineering, 4(1), pp. 13-26, 2017.

2016.

[13] **V. Lyzinski**, K. Levin, D. E. Fishkind, C. E. Priebe, "On the Consistency of the Likelihood Maximization Vertex Nomination Scheme: Bridging the Gap Between Maximum Likelihood Estimation and Graph Matching," Journal of Machine Learning Research, 17(179), pp.1-34, 2016.

[12] L. Chen, J. T. Vogelstein, **V. Lyzinski**, C. E. Priebe, "A Joint Graph Inference Case Study: The C.elegans Chemical and Electrical Connectomes," Worm, Vol. 5 no. 2, 2016.

[11] A. Athreya, **V. Lyzinski**, D. Marchette, C. E. Priebe, D. Sussman, M. Tang, "A Limit Theorem for Scaled Eigenvectors of Random Dot Product Graphs," Sankhya A, pp. 1–18, 2016.

[10] J. A. Fill, **V. Lyzinski**, "Strong Stationary Duality for Diffusion Processes," Journal of Theoretical Probability, 29.4, pp. 1298–1338, 2016.

[9] **V. Lyzinski**, D. Fishkind, M. Fiori, J. T. Vogelstein, C. E. Priebe, G. Sapiro, "Graph Matching: Relax at Your Own Risk," IEEE Transactions on Pattern Analysis and Machine Intelligence, 38.1: 60-73, 2016.

2015.

[8] D. E. Fishkind, **V. Lyzinski**, H. Pao, L. Chen, C. E. Priebe, "Vertex Nomination Schemes for Membership Prediction," Annals of Applied Statistics, Vol. 9 no. 3, pp. 1510-1532, 2015.

[7] J. T. Vogelstein, J. M. Conroy, **V. Lyzinski**, L. J. Podrazik, S. G. Kratzer, E. T. Harley, D. E. Fishkind, R. J. Vogelstein, C. E. Priebe, "Fast Approximate Quadratic Programming for Graph Matching," PLOS One, Vol. 10 no. 4, 2015.

[6] **V. Lyzinski**, D. L. Sussman, D. E. Fishkind, H. Pao, C. E. Priebe, "Spectral Clustering for Divide-and-conquer Graph Matching," Parallel Computing, Vol. 47, pp. 70–87, 2015.

[5] A. Godbole, S. Gutekunst, **V. Lyzinski**, Y. Zhuang, "Logarithmic Representability of Integers as k-sums," Integers: The Electronic Journal of Combinatorial Number Theory, Vol. 15A, 2015.

2014.

[4] **V. Lyzinski**, D. L. Sussman, M. Tang, A. Athreya, C. E. Priebe, "Perfect Clustering for Stochastic Blockmodel Graphs via Adjacency Spectral Embedding," Electronic Journal of Statistics, Vol. 8, pp. 2905–2922, 2014.

[3] **V. Lyzinski**, D. E. Fishkind, C. E. Priebe, "Seeded Graph Matching for Correlated Erdös-Rényi Graphs," Journal of Machine Learning Research, Vol. 15, no. 1, 2014.

[2] J. A. Fill, **V. Lyzinski**, "Hitting Times and Interlacing Eigenvalues: A Stochastic Approach Using Intertwinings," Journal of Theoretical Probability, Vol. 27, no. 3, pp. 954–981, 2014.

2013.

[1] A. Godbole, C. M. Lim, **V. Lyzinski**, N. Triantafillou, "Sharp Threshold Asymptotics for the Emergence of Additive Bases," Integers: The Electronic Journal of Combinatorial Number Theory, Vol. 13, 2013.

Refereed Conference Publications

[1] **V. Lyzinski**, G. Sell, A. Jansen, "An Evaluation of Graph Clustering Methods for Unsupervised Term Discovery," Proceedings of Interspeech, Dresden, Germany, 2015.

Refereed Workshop Publications

[4] K. Pantazis, D. L. Sussman, Y. Park, C. E. Priebe, **V. Lyzinski**, "Multiplex graph matching matched filters," GTA^3 3.0: The 3rd Workshop on Graph Techniques for Adversarial Activity Analytics, in conjunction with In Conjunction with the 2019 IEEE Big Data Conference, Los Angeles, CA, 2019.

[3] D. Sussman, **V. Lyzinski**, Y. Park, C. E. Priebe, "Matched Filters for Noisy Indued Subgraph Detection," GTA^3 2018: Workshop on Graph Techniques for Adversarial Activity Analytics, in conjunction with 11th ACM International Conference on Web Search and Data Mining, Marina Del Rey, CA, 2018. **(won the best paper award)**

[2] J. Douglas, B. Zimmerman, A. Kopylov, J. Xu, D. Sussman, **V. Lyzinski**, "Metrics for Evaluating Network Alignment," GTA^3 2018: Workshop on Graph Techniques for Adversarial Activity Analytics, in conjunction with 11th ACM International Conference on Web Search and Data Mining, Marina Del Rey, CA, 2018.

[1] K. Levin, A. Avanti, M. Tang, **V. Lyzinski**, C. E. Priebe, "A Central Limit Theorem for an Omnibus Embedding of Multiple Random Dot Product Graphs," In 2017 IEEE International Conference on Data Mining Workshops (ICDMW), pp. 964-967, 2017.

Technical Reports

[1] P. Rastogi, **V. Lyzinski**, B. Van Durme, "Vertex nomination on the cold start knowledge graph," Human Language Technology Center of Excellence: Technical report, 2017.

Submitted Papers and Preprints

[12] T. Qi, **V. Lyzinski**, "Detection of Model-based Planted Pseudo-cliques in Random Dot Product Graphs by the Adjacency Spectral Embedding and the Graph Encoder Embedding," arXiv 2312.11054, 2023

[11] T. Lu, Y. Zhang, **V. Lyzinski**, C. Bi, P. Kochunov, E. Hong, S. Chen, "Evaluating the effects of high-throughput structural neuroimaging predictors on whole-brain functional connectome outcomes via network-based vector-on-matrix regression," arXiv 2310.18533, 2023

[10] Z. Li, B. Johnson, D.L. Sussman, C.E. Priebe, **V. Lyzinski**, "Gotta match'em all: Solution diversification in graph matching matched filters," arXiv 2308.13451, 2023

[9] L. Meng, M. Lou, J. Lin, **V. Lyzinski**, D.E. Fishkind, "On seeded subgraph-to-subgraph matching: The ssSGM Algorithm and matchability information theory," arXiv 2306.04016, 2023

[8] S. Peyman, M. Tang, **V. Lyzinski**, "Adversarial contamination of networks in the setting of vertex nomination: a new trimming method," arXiv 2208.09710, 2022

[7] A. Saxena, **V. Lyzinski**, "Lost in the Shuffle: Testing Power in the Presence of Errorful Network Vertex Labels," arXiv 2208.08638, 2022

[6] H. S. Helm, M. Abdin, B. D. Pedigo, S. Mahajan, **V. Lyzinski**, Y. Park, A. Basu, C. M. White, W. Yang, and C. E. Priebe, "Leveraging semantically similar queries for ranking via combining representations," arXiv 2106.12621, 2021.

[5] K. Levin, C. E. Priebe, **V. Lyzinski**, "On the role of features in vertex nomination: Content and context together are better (sometimes)," arXiv 2005.02151, 2020.

[4] F. Fang, D. L. Sussman, **V. Lyzinski**, "Tractable Graph Matching via Soft Seeding," arXiv 1807.09299. 2018.

[3] C.E. Priebe, Y. Park, M. Tang, A. Athreya, **V. Lyzinski**, J. T. Vogelstein, Y. Qin, B. Cocanougher, K. Eichler, M. Zlatic, A. Cardona, "Semiparametric spectral modeling of the Drosophila connectome," arXiv 1705.03297, 2017.

[2] K. Levin, A. Athreya, M. Tang, **V. Lyzinski**, C.E. Priebe, "A central limit theorem for an omnibus embedding of random dot product graphs," arXiv:1705.09355, 2017.

[1] H. Patsolic, S. Adali, J. Vogelstein, Y. Park, C. E. Priebe, G. Li, **V. Lyzinski** "Seeded Graph Matching via Joint Optimization of Fidelity and Commensurability," arXiv 1401.3813, 2014 (2019). *(2019 is the date of the updated revision)*

Conferences, Workshops, Seminars, and Invited Talks

Detection of Model-based Planted Pseudo-cliques in Random Dot Product Graphs by the Adjacency Spectral Embedding and the Graph Encoder Embedding

- Invited talk in an organized invited session (entitled "EO057 Advancements in statistical network analysis") at the 16th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2023); 12/16/23–12/18/23

Lost in the Shuffle: Testing Power in the Presence of Errorful Network Vertex Labels

- Invited talk in the "Statistical Inference for Network Models" satellite at NetSci 2023; 7/11/23

- Invited talk in an organized invited session (entitled "EO024 Statistical network analysis III") at the 6th International Conference on Econometrics and Statistics (EcoSta 2023); 8/1/23–8/3/23

- Invited talk in the AMS Seminar at Johns Hopkins University, Department of Applied Mathematics & Statistics; 3/16/23

- Invited talk in an organized invited session (entitled "EO712: Advances in multiple network data analysis") at the 15th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2022); 12/17/22–12/19/22

Clustered Graph Matching for Label Recovery and Graph Classification

- Invited talk at invited session (entitled IS-17: Statistical Inference for and with Network Data) at New England Statistics Symposium (NESS), May 22 - 25, 2022

Maximum Likelihood Estimation and Graph Matching in Errorfully Observed Networks

- Invited talk at Joint Mathematics Meetings in AMS Special Session on Transient Probabilities of Random Processes, Duality Theory and Gamblers Ruin Probabilities. Originally scheduled for Jan 2022, moved to April 2022 due to COVID

Multiplex graph matching matched filters

- Talk at workshop: Complex Networks: Analysis, Numerics, and Applications (workshop at UMD I co-organized with Radu Balan, Maria Cameron, and Wojciech Czaja). February 18-19, 2022

- Workshop presentation at GTA^3 3.0: The 3rd Workshop on Graph Techniques for Adversarial Activity Analytics, in conjunction with In Conjunction with the 2019 IEEE Big Data Conference. December, 2019

The Importance of Being Correlated: Implications of Dependence in Joint Spectral Inference across Multiple Networks

- Invited talk in CMAI Colloquium at George Mason University; 2/11/22

- Invited talk in an organized invited session (entitled "EO342: Recent developments in statistical network analysis") at the 14th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2021); 12/18/21–12/20/21

- Invited talk in the STAT seminar, University of Maryland, College Park; 9/9/21

- Invited talk in the AMS Seminar at Johns Hopkins University, Department of Applied Mathematics & Statistics; 10/29/20

- Invited talk in the 2020 Tufts Computational and Applied Math Seminar; 9/28/20

- Invited talk in the STAT seminar, University of Delaware; 9/25/20

Graph Matching Matched Filters on Richly Featured Networks

- Invited talk, Graph Analytics Tutorial at the JHU HLTCOE, 8/26/2021

Some (broad and specific) recent graph matching developments

- Invited guest lecture in Professor Minh Tang's graduate topics course on "Statistical Inference on Graphs" at NCSU, 11/12/2020

Vertex Nomination, Consistent Estimation, and Adversarial Modification

- Invited talk at the IMA workshop on Theory and Algorithms of Graph-based Learning taking place September 14-18, 2020

- Invited talk at the UMD Norbert Weiner Center for Harmonic Analysis and Applications. October, 2019

- Invited talk at Deb Roy's lab meeting at MIT Media Lab/Cortico. April, 2019

Matchability of Heterogeneous Networks Pairs

- Invited talk at NIST, January 8, 2020

- Invited talk in the UMD Statistics Seminar series. September, 2019

- Invited session on New Advances in Network Data Analysis at the 2019 New England Statistics Symposium. May, 2019

Consistency in vertex nomination

- Invited session on Exploiting Latent Structure for Network Inference at the 2019 Joint Statistics Meetings. July–August, 2019

Graph matching in edge-independent networks

- Invited speaker, University of North Carolina, Chapel Hill, STOR Colloquium. January 18, 2019

- Invited speaker, Boston University Department of Mathematics and Statistics, Statistics and Probability Seminar Series. October 11th, 2018.

Consistent vertex nomination

- Invited speaker, University of Maryland Department of Mathematics Colloquium. January 11, 2018

Graph Matching and Graph Matchability in Edge-Independent Networks

- Invited session on Graphs: Inference and Mining at the 56th Annual Allerton Conference on Communication, Control, and Computing. October, 2018.

Graph matching and network inference in biological applications

- Invited speaker, Yale University Department of Biostatistics Seminar. September, 2018.

Graph Matching and Subsequent Inference in Errorfully Observed Network Data

- Invited session on Recent Advances in Multiple Graph Inference at the 2018 Joint Statistics Meeting. July–August, 2018.

On consistent vertex nomination schemes

- Invited speaker, University of Massachusetts, Amherst, Department of Mathematics and Statistics, Applied Mathematics and Computation Seminar. April, 2018

- Invited speaker, Five College Statistics and Data Science Research Bytes. February, 2018

- Invited speaker, Boston University, Department of Mathematics and Statistics, Statistics and Probability Seminar Series. November, 2017

Information Recovery in Errorfully Labeled Graphs via Graph Matching

- Invited speaker, UConn/UMass Statistics Colloquium. April, 2018

- Invited speaker, Duke University, Department of Statistical Science Seminar. September, 2017

- Invited speaker, University of Florida, Department of Statistics Seminar. January, 2017

- Invited speaker, University of Maryland, Department of Mathematics Colloquium. January, 2017

- Invited speaker, University of Massachusetts, Amherst, Department of Mathematics and Statistics Colloquium. December, 2016

- Invited speaker, University of Houston, Department of Mathematics Seminar. December, 2016

- Invited seminar, Issac Newton Institute for Mathematical Sciences. November, 2016

- Invited Session on Advances and Novel Problems in Network Statistics at the 2016 Joint Statistics Meeting. July–August, 2016

Network Matched Filters

- Invited session on Scan Statistics in Networks and Graphs at the 2017 Joint Statistics Meeting. July–August, 2017

Recent theoretic and algorithmic advances in graph matching

- Invited speaker, JHU Department of Applied Mathematics and Statistics Seminar. February, 2016

Community Detection and Classification in Hierarchical Stochastic Blockmodels

- Invited speaker, Session on Statistical Inference for High-Dimensional Data, International Society for Nonparametric Statistics Meeting. July, 2015

The Cortical Column Conjecture and Related Connectomic Problems

- Invited guest lecture, Statistical Learning from Omics Data at SAMSI. April, 2015

Spectral Clustering for Divide-and-Conquer Graph Matching

- Invited speaker, Virginia Commonwealth University Special VCU Statistics and Discrete Mathematics Seminar Series. February, 2015

(Robust) Seeded Graph Matching

- Regular contributed paper, 2014 Joint Statistics Meetings. August, 2014

Seeded Graph Matching

- Contributing speaker, 14th Haifa Workshop on Graph Theory, Combinatorics, and Algorithms. June, 2014

- Invited speaker, Johns Hopkins HLTCOE Seminar Series. February, 2013

- Invited speaker, George Mason University Department of Statistics Seminar. January, 2013

- Johns Hopkins University Department of Applied Mathematics and Statistics Student Seminar Series. February, 2013

Seeded Graph Matching and Applications

- Invited speaker, George Mason University SPACS/CCDS/Statistics Colloquium Series. March, 2013

Large Graph Matching with Applications to Brain Networks

- Invited by Guillermo Sapiro to give seminar at the Information Initiative at Duke University. October, 2013

Strong Stationary Duality for Diffusion Processes

- Invited speaker, Session on Markov Chains and Markov Decision Problems at INFORMS Applied Probability Society Conference. July, 2013

- Invited speaker, Session on Computational and Discrete Mathematics at the Canadian Applied and Industrial Mathematics Society Conference. June 2012

Sharp Threshold Asymptotics for the Emergence of Additive Bases

- Regular contributed paper, AMS Session on Probability Theory, Stochastic Processes and Statistics at the Joint Mathematics Meeting. January, 2012

- Johns Hopkins University Department of Applied Mathematics and Statistics Student Seminar Series. October, 2011

Multivariate Records

- Invited speaker, George Washington University Department of Statistics Student Seminar Series. October, 2010

- Johns Hopkins University Department of Applied Mathematics and Statistics Student Seminar Series. October, 2010

A Stochastic Interpretation of a Hitting Time Result of Mark Brown

- Johns Hopkins University Department of Applied Mathematics and Statistics Student Seminar Series. April, 2010

The Comparison Method for the Relaxation Time of Ergodic Markov Chains

- Contributed talk, Fields–MITACS Summer School in Applied Probability. May 2009

- Johns Hopkins University Department of Applied Mathematics and Statistics Student Seminar Series. March, 2009

Posters Presented

Core Detection: Sifting Through The Junk in Graph Matching

- Poster presented at 2017 SIAM Workshop on Network Science, July 2017

Recent theoretic and algorithmic advances in graph matching

- Poster presentation and flash talk, The 2016 IMS New Researchers' Conference. July, 2016

Seeded Graph Matching

- Poster presented at Duke Workshop on Sensing and Analysis of High Dimension Data, July 2013

Sponsored Research and Programs

Active awards

2020-2024 **Center of Excellence in Human Language Technology**.

- Funding Source: JHU HLTCOE sub-award to UMD
- Role: Investigator (1 month of my summer effort funded per award)
- Total award amount: $297,018 (DO05 2020-2021); $300,594 (DO06 2021-2022); $146,605 (DO07; my effort funded under Task NLU portion of award 2022-2023; total award amount with all tasks $313,170); $229,881 (total amount for all tasks; DO08 2023-2024)
- PI at UMD: Douglas Oard, UMIACS

Completed Awards (total $: as PI $2.32M, as co-PI $5.95M)

2020–2023 **Algorithmic Primitives for Aligning and Merging Complex Networks**.

- Funding Source: Defense Advanced Research Projects Agency, I2O Open Office (for the Modeling Adversarial Activity program)
- Role: Principal Investigator
- Total award amount: $1,320,646.00 ($999,146 award with $321,500 mod)
- Subcontract PIs Carey E. Priebe and Youngser Park (JHU) and Daniel Sussman (Boston University)
- Award extension through July 2023

2018–2022 **A 5-dimensional connectomic approach to the neural basis of behavior**.

- Funding Source: NIH Brain Initiative: Exploratory Team-Research BRAIN Circuit Programs eTeamBCP
- Role: co-PI
- Total award amount: $3,754,785
- PI: Paul Katz at UMass; Subcontract PIs Jeff Lichtman (Harvard University), William Frost (Rosalind Franklin University), and Deirdre Lyons (University of California, San Diego)

- Award extension through August 2022

2017–2021 **What Would Tukey Do? <enter>**.

- Funding Source: Defense Advanced Research Projects Agency, Data-Driven Discovery of Models program
- Role: co-PI (at JHU)
- Total award amount: $2.2M
- PI: Carey Priebe at JHU; co-PIs Minh Tang, Avanti Athreya, Youngser Park and Joshua T. Vogelstein

2017–2019 **Universally Useful Primitives for Aligning Networks Across Time and Space**.

- Funding Source: Defense Advanced Research Projects Agency, I2O Open Office (for the Modeling Adversarial Activity program)
- Role: Principal Investigator (at UMass)
- Total award amount: $1,004,433
- Subcontract PIs Carey E. Priebe and Youngser Park (JHU) and Daniel Sussman (Boston University)
- No cost extension awarded through January 2020

Research Fellowships, Prizes and Awards

2012 Graduate Student Travel Grant to the Joint Mathematics Meetings, Boston MA, January 4–7

2009–2012 GAANN Fellowship, U.S. Department of Education awarded through the Department of Applied Mathematics and Statistics, The Johns Hopkins University

2008–2012 Counselman Endowed Fellowship, awarded by the Department of Applied Mathematics and Statistics, The Johns Hopkins University; Awarded in 2nd year of Ph.D. (2008) with continued award funding through AY 2011-12

2008 Naddor Teaching Fellowship, awarded by the Department of Applied Mathematics and Statistics, The Johns Hopkins University

2007 Naddor Teaching Fellowship, awarded by the Department of Applied Mathematics and Statistics, The Johns Hopkins University

2007 Rufus P. Isaacs Graduate Fellowship, awarded by the Department of Applied Mathematics and Statistics, The Johns Hopkins University

2006 The Haaser Scholarship in Mathematics (awarded for excellence in mathematics), awarded by the Department of Mathematics, University of Notre Dame

2006 Senior GE Prize for Mathematics Majors (awarded for excellence in mathematics), awarded by the Department of Mathematics, University of Notre Dame

Teaching

Courses Taught

Spring 2024 **STAT689: RIT in Statistical Network Inference**.
University of Maryland, College Park

Spring 2024 **DATA350: Data Visualization and Presentation**.
University of Maryland, College Park

Spring 2024 **STAT650: Applied Stochastic Processes**.
University of Maryland, College Park

Fall 2023 **DATA350: Data Visualization and Presentation**.
University of Maryland, College Park; 9 students

Fall 2023 **DATA607: Communication in Data Science and Analytics**.
University of Maryland, College Park; part of Data Science & Analytics Master's Degree Program; 32 students

Spring 2023 **STAT650: Applied Stochastic Processes**.
University of Maryland, College Park; 17 students

Spring 2023 **STAT426: Introduction to Data Science and Machine Learning**.
University of Maryland, College Park; 21 students

Fall 2022 **STAT426: Introduction to Data Science and Machine Learning**.
University of Maryland, College Park; 17 students

Fall 2022 **DATA607: Communication in Data Science and Analytics**.
University of Maryland, College Park; part of Data Science & Analytics Master's Degree Program; 29 students

Spring 2022 **STAT426: Introduction to Data Science and Machine Learning**.
University of Maryland, College Park; 27 students

Spring 2022 **STAT650: Applied Stochastic Processes**.
University of Maryland, College Park; 17 students

Fall 2021 **STAT426: Introduction to Data Science and Machine Learning**.
University of Maryland, College Park; 33 students

Fall 2021 **DATA607: Communication in Data Science and Analytics**.
University of Maryland, College Park; part of Data Science & Analytics Master's Degree Program; 26 students

Spring 2021 **STAT650: Applied Stochastic Processes**.
University of Maryland, College Park; 27 students

Winter 2020/2021 **DATA607: Communication in Data Science and Analytics**.
University of Maryland, College Park; part of Data Science & Analytics Master's Degree Program; 4 students

Fall 2020 **STAT705: Computational Statistics**.
University of Maryland, College Park; 20 students

Spring 2020 **STAT426: Introduction to Data Science and Machine Learning**.
University of Maryland, College Park; 26 students, pilot course (now permanent)

Spring 2020 **STAT689: RIT in Statistical Network Inference**.
University of Maryland, College Park; 8 students enrolled and numerous faculty sat in

Fall 2019 **STAT426: Introduction to Data Science and Machine Learning**.
University of Maryland, College Park; 23 students, pilot course (now permanent)

Spring 2019 **STAT 516: Statistics II**.
University of Massachusetts, Amherst; 41 students

Spring 2019 **STAT 496: Independent Study**.
University of Massachusetts, Amherst; undergraduate independent study with 1 student

Fall 2018 **STAT 697S: ST Statistical Network Inference**.
University of Massachusetts, Amherst; Graduate level topics course, 8 students

Spring 2018 **STAT 516: Statistics II**.
University of Massachusetts, Amherst; 2 sections with 22 and 35 students respectively

Spring 2018 **Math 596: Independent Study**.
University of Massachusetts, Amherst; undergraduate independent study with 1 student

Fall 2016 **550.621: Probability Theory II**.
Johns Hopkins University; graduate level, 7 students

Fall 2015 **550.620: Probability Theory I**.
Johns Hopkins University; graduate level, 22 students

Spring 2014 **550.771: The Probabilistic Method**.
Johns Hopkins University; graduate level topics course, 9 students

Fall 2013 **550.310: Probability and Statistics for the Physical and Information Sciences and Engineering**.
Johns Hopkins University; 76 students

Summer 2013 **550.111: Statistical Analysis I**.
Johns Hopkins University; 18 students

Spring 2013 **550.111: Statistical Analysis I**.
Johns Hopkins University; 152 students

Fall 2012 **550.310: Probability and Statistics for the Physical and Information Sciences and Engineering**.
Johns Hopkins University; 72 students

Summer 2012 **550.230: Introduction to Biostatistics**.
Johns Hopkins University; 6 students

Fall 2011 **550.310: Probability and Statistics for the Physical and Information Sciences and Engineering**.
Johns Hopkins University; 73 students

Summer 2011 **550.230: Introduction to Biostatistics**.
Johns Hopkins University; 8 students

Spring 2011 **550.310: Probability and Statistics for the Physical and Information Sciences and Engineering**.
Johns Hopkins University; 41 students

Spring 2010 **550.310: Probability and Statistics for the Physical and Information Sciences and Engineering**.
Johns Hopkins University; 85 students

Summer 2009 **550.171: Discrete Mathematics**.
Johns Hopkins University; 6 students

Summer 2008 **550.111: Statistical Analysis I**.
Johns Hopkins University; 20 students

Mentoring and Advising

UMD Postdoc advising

- Jesus Arroyo AY 2020-2021 (Funded entirely by DARPA MAA award); Currently Tenure-track Assistant Professor, Department of Statistics, Texas A&M University

UMD Ph.D. student advising

- Al-Fahad Al-Qadhi; Doctoral Candidate, AMSC
- Zhirui Li; Doctoral Candidate, AMSC
- Tong Qi; Doctoral Candidate, STAT

UMD Ph.D. thesis advisor for Sheyda Peyman, AMSC program, University of Maryland, College Park

- Expected graduation with Ph.D. May 2024 (dissertation defense scheduled for April 4th, 2024)
- Dissertation: Structured Discovery in Graphs: Recommender Systems and Temporal Graph Analysis

UMD Ph.D. thesis advisor for Ayushi Saxena, Department of Mathematics (Statistics Program), University of Maryland, College Park

- Graduation with Ph.D. May 2024 (dissertation successfully defended February 27th, 2024)
- Dissertation: The Shuffling Effect: Vertex Label Error's Impact on Hypothesis Testing, Classification, and Clustering in Graph Data
- Position with federal government aftter graduation

UMD Ph.D. thesis advisor for Konstantinos Pantazis, Department of Mathematics, University of Maryland, College Park

- Graduated with Ph.D. May 2022
- Dissertation: Statistical Inference across Multiple Graphs: Advancements in Multiplex Graph Matching and Joint Spectral Graph Embeddings
- Internship at MSR summer 2022, Postdoc at JHU AY 2022-2023

UMD Ph.D. thesis advisor for Jesse Milzman (co-advised with Prof. Doron Levy (primary)), Department of Mathematics, University of Maryland, College Park

- Graduated with Ph.D. Summer 2021
- Dissertation: Dynamics, Networks, and Information: Methods for Nonlinear Interactions in Biological Systems
- Currently at ARL

JHU Ph.D. thesis advisor for Heather Gaddy Patsolic (co-advised with Carey E. Priebe), Department of Applied Mathematics and Statistics, Johns Hopkins University

- Graduated with Ph.D. Spring 2020
- Dissertation: Graph Matching and Vertex Nomination
- Now with Accenture Federal Services

JHU Ph.D. thesis advisor for Keith Levin (co-advised with Carey E. Priebe and Ben Van Durme), Department of Computer Science, Johns Hopkins University

- Graduated with Ph.D. Spring 2017
- Dissertation: Graph Inference with Applications to Low-Resource Audio Search and Indexing

- Postdoc, JHU (2017); Postdoc, University of Michigan, Department of Statistics (2017-2020); Tenure-Track Assistant Professor, University of Wisconsin Madison, Department of Statistics (2020-present)

Service and Outreach

Reviewing Activities

Federal grant reviews.

- Proposal reviewer for NSF, 2023

Panel reviews.

- Proposal reviewer as part of the DOE Early Career Research Program Scientific Machine Learning Review Panel, 2021

Reviewed papers for the following journals/conferences:.

- 12th International Conference on Complex Networks & Their Applications
- Algorithms
- Annales de l'institut Henri Poincare (Prob. and Stat.)
- Annals of Applied Probability
- Annals of Probability
- Annals of Statistics
- Applied Network Science
- Canadian Journal of Statistics
- Combinatorics, Probability, and Computing
- Computational and Applied Mathematics
- Electronic Journal of Probability
- ESAIM: Probability and Statistics
- ICLR 2021
- IEEE Journal on Selected Areas in Information Theory
- IEEE Transactions on Information Theory
- IEEE Transactions on Knowledge and Data Engineering
- IEEE Transactions on Medical Imaging
- IEEE Transactions on Network Science and Engineering
- IEEE Transactions on Neural Networks and Learning Systems
- IEEE Transactions on Pattern Analysis and Machine Intelligence
- Involve, a Mathematics Journal
- Journal of the American Statistical Association
- Journal of the Royal Statistical Society: Series B
- Markov Processes and Related Fields
- Networks and Heterogeneous Media
- NeurIPS 2019
- Neuroimage

- Parallel Computing
- Pattern Recognition Letters
- Probability in the Engineering and Informational Sciences
- Proceedings of the National Academy of Sciences
- Random Structures and Algorithms
- SIAM Journal on Mathematics of Data Science
- Statistics and Computing
- Theory of Computing System

Committees, Professional & Campus Service

2019 – **University of Maryland, College Park**.

Departmental Service.

- Member, AMSC Graduate Committee, AY 2022-2023, AY 2023-2024
- Member, AMSC graduate admissions committee, AY 2019-20, AY 2020-2021, AY 2021-2022, and AY 2022-2023, AY 2023-2024
- Member, Mathematics Department hiring committee, AY 2022-2023
- Organizing committee, Norbert Wiener Center for Harmonic Analysis and Applications Faraway Fourier Talks (FFT) , AY 2020-2021 and 2021-2022
- Member, Mathematics Department Postdoc search committee, AY 2020-2021 and 2021-2022
- Member, Mathematics Department Policy Committee, AY 2021-2022
- Math Ambassador for Virtual Visiting Day, 3/10/21; 3/15/2022
- AMSC Ambassador for Virtual Visiting Day, 3/10/21
- Organizer, Mathematics Department Statistics Seminar, AY 2019-20 and AY 2020-21
- Member, Mathematics Department committee set up to help with technical aspects of the transition to remote teaching, Spring 2020
- Member, AMSC Scientific Computing track reform committee, Fall 2019
- Member of the Ph.D. Final Oral Exam Committee (i.e., Thesis Defense) for

— Xuze Zhang (03/2024)
— Ayushi Saxena (02/2024)
— Yishan Ding (11/2023)
— Jeremiah Emidih (08/2023)
— Xiaoyu Zhou (08/2023)
— Ying Li (07/2023)
— Yifan Yang (07/2023)
— Tong Lu (6/2023)
— Luke Evans (04/2023)
— Yi Zhou (04/2023)
— Andrew Lauziere (10/2022)

— Chris Dock (04/2022)
— Konstantinos Pantazis (04/2022)
— Liam Fowl (03/2022)
— Gustavo Varela Alvarenga (08/2021)
— Qiong Wu (06/2021)
— Catherine Schwartz (06/2021)
— Lingyao Meng (at JHU) (06/2021)
— Jesse Milzman (05/2021)
- Member of the MSc. Master's Thesis Defense committee for
— Philip Casey (04/2022)
- Member of the Ph.D. Preliminary Oral Exam Committee for
— Perrin Ruth (03/2024)
— Mengting Chao (01/2024)
— Yilin Zhang (11/2023)
— Shuhan Kou (05/2023)
— Zhiwei Zhao (02/2023)
— Al-Fahad Al-Qadhi (11/2022)
— Zhirui Li (11/2022)
— Haeyun Seo (09/2022)
— Canran Ji (08/2022)
— Phillip Koshute (05/2022)
— Tong Qi (05/2022)
— Efstratios Tsoukanis (02/2022)
— Tong Lu (08/2021)
— Ayushi Saxena (02/2021)
— Sheyda Peyman (01/2021)
— Cem Unsal (01/2021)
— Luke Evans (12/2020)
— Qiong Wu (08/2020)
— Xiaoyu Zhou (07/2020)
— Konstantinos Pantazis (05/2020)
— Andrew Lauziere (12/2019)
— Chris Dock (05/2019)
- Member of the Dissertation Proposal Committee for
— Yishan Ding, Measurement, Statistics and Evaluation Program, EDMS, UMD (11/2022)

College-level Service.
- Invited talk at COMBINE seminar course (PHYS781), December 2021
- Faculty flash talk at 2021 COMBINE Lightning Workshop

2017–2019 **University of Massachusetts, Amherst**.

Departmental Service.

- Member of the Tenure-Track Statistics Assistant Professor Search Committee, AY 2018-19

- Organizer, Probability and Statistics Seminar series AY 2017-18

- Member, VAP Postdoc Search Committee, AY 2017-18

University-level Service.

- UMass Amherst DataFest Local Organizer, DataFest 2019

2015–2020 **Johns Hopkins University**.

Departmental Service.

- Served on one Johns Hopkins University Ph.D. candidacy exam committee (Heather Pastolic)

- Served on six Johns Hopkins University dissertation defense committees (Li Chen, Henry Pao, Cencheng Shen, Jordan Yoder (served as Second Reader), Keith Levin, Heather Patsolic)

College-level Service.

-Served on three Johns Hopkins University Graduate Board Oral exam committees (Travis Wolfe, Pushpendre Rastogi and Jordan Yoder)

Conference/Workshop Organization

2023 Co-organized a workshop (along with Avanti Athreya at JHU and Minh Tang at NCSU) entitled " Statistical Inference on Networks and High-Dimensional Data" at The Brin Mathematics Research Center at UMD (10/18/2023-10/20/2023)

2023 Organized an invited session entitled " Emerging questions in network inference" at the 16th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2023)

2023 Program Co-chair (organizer), 7th workshop on Graph Techniques for Adversarial Activity Analytics (GTA^3 7.0) in conjunction with the 2022 IEEE Big Data conference. December 2023

2022 Organized an invited session entitled "Spectral methods in statistical network inference" at the 15th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2022)

2022 Program Co-chair (organizer), 6th workshop on Graph Techniques for Adversarial Activity Analytics (GTA^3 6.0) in conjunction with the 2022 IEEE Big Data conference. December 2022

2022 Workshop co-organizer (with Profs. Radu Balan, Wojtek Czaja, Maria Cameron), Complex Networks: Analysis, Numerics, and Applications. Workshop held at UMD Math/Norbert Wiener Center, February 2022

2021 Program Co-chair (organizer), 5th workshop on Graph Techniques for Adversarial Activity Analytics (GTA^3 5.0) in conjunction with the 2021 IEEE Big Data conference. December 2021

2021 Co-organized (with Avanti Athreya (JHU) and Keith Levin (UWisc)) a satellite entitled "Low-rank models in multiple-network analysis" at Networks 2021: A Joint Sunbelt and NetSci Conference

2020 Program Co-chair (organizer), 4th workshop on Graph Techniques for Adversarial Activity Analytics (GTA^3 4.0) in conjunction with the 2020 IEEE Big Data conference. December 2020

2019 Program Co-chair (organizer), 3rd workshop on Graph Techniques for Adversarial Activity Analytics (GTA^3 3.0) in conjunction with the 2019 IEEE Big Data conference. December 2019

2018 Program Co-chair (organizer), 2nd workshop on Graph Techniques for Adversarial Activity Analytics (GTA^3 2.0) in conjunction with the 2018 IEEE Big Data conference. December 10th, 2018

2018 Co-organized (with Daniel L. Sussman) an Invited Session at the 2018 Joint Statistics Meetings on Recent Advances in Multiple Graph Inference

2017 Co-organized (with Betsy Ogburn of JHU Biostats) the 2017 IMS New Researchers Conference

- Supported by grant N00014-17-1-2512 from the Office of Naval Research, $15,000 (PI joint with Betsy Ogburn)

- Supported by grant 1 R13 CA221378-01 from the National Institutes of Health, $18,566 (PI joint with Betsy Ogburn (contact))

- Also generously supported by NSF

2016 Served on program committee for 4th SIAM Workshop on Network Science, July 2016

2015 Co-organized (with Daniel L. Sussman) the Session on Statistical Inference for High-Dimensional Data at the International Society for Nonparametric Statistics Meeting, July 2015

External Committee Membership

2016–2019 IMS Committee on New Researchers