

Curriculum Vitae

Vince Lyzinski

Department of Mathematics and Statistics
University of Massachusetts, Amherst
Amherst, MA 01003 USA
e-mail: vlyzinski@umass.edu

Education

- Ph.D., Applied Mathematics and Statistics, Johns Hopkins University, 2013
Advisor: Prof. James Allen Fill
Dissertation title: Intertwinings, Interlacing Eigenvalues, and Strong Stationary Duality for Diffusions
- M.S.E., Applied Mathematics and Statistics, Johns Hopkins University, 2011
- M.S., Mathematics, Johns Hopkins University, 2007
- B.S., Mathematics, University of Notre Dame, 2006; *Magna Cum Laude*
Studied abroad via the Budapest Semesters in Mathematics

Academic and Other Research Positions

- *Assistant Professor*, University of Massachusetts, Amherst; Department of Mathematics and Statistics, September 2017–present
- *Senior Research Scientist*, The Human Language Technology Center of Excellence at Johns Hopkins University, August 2014–August 2017
- *Assistant Research Professor*, Johns Hopkins University, Department of Applied Mathematics and Statistics, August 2014–present
- *Postdoctoral Fellow*, Johns Hopkins University, Department of Applied Mathematics and Statistics, January 2013–August 2014
- *Graduate Advisor*, East Tennessee State University Research Experience for Undergraduates (REU) under Prof. Anant Godbole, 2012

Research Publications

Refereed Journal Publications

1. **V. Lyzinski**, K. Levin, C.E. Priebe, “On Consistent Vertex Nomination Schemes,” *Journal of Machine Learning Research*, accepted for publication (conditioned on minor revisions), 2018.
2. P. Rastogi, A. Poliak, **V. Lyzinski**, and B. Van Durme, “Neural Variational Entity Set Expansion for Automatically Populated Knowledge Graphs,” *Information Retrieval Journal*, accepted for publication, 2018.
3. 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.

4. **V. Lyzinski**, “Information Recovery in Shuffled Graphs via Graph Matching,” *IEEE Transactions on Information Theory*, Vol. 64 no. 5, pp.3254-3273, 2018.
5. 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.
6. 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.
7. K. Levin and **V. Lyzinski**, “Laplacian Eigenmaps from Sparse, Noisy Similarity Measurements,” *IEEE Transactions on Signal Processing*, Vol. 65 no. 8, 2017.
8. **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.
9. **V. Lyzinski**, Y. Park, C. E. Priebe, Michael Trosset, “Fast Embedding for JOFC Using the Raw Stress Criterion,” *Journal of Computational and Graphical Statistics*, accepted for publication 2017.
10. 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.
11. **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. 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.
13. 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.
14. 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.
15. **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.
16. 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.
17. 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.
18. 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.
19. **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.

20. **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.
21. 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.
22. J. A. Fill, **V. Lyzinski**, "Strong Stationary Duality for Diffusion Processes," *Journal of Theoretical Probability*, pp. 1-41, 2014.
23. **V. Lyzinski**, D. E. Fishkind, C. E. Priebe, "Seeded Graph Matching for Correlated Erdős-Rényi Graphs," *Journal of Machine Learning Research*, Vol. 15, no. 1, 2014.
24. 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.
25. 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 Proceedings

1. D. Sussman, **V. Lyzinski**, Y. Park, C. E. Priebe, "Matched Filters for Noisy Induced Subgraph Detection," *GTA³ 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, Feb 9, 2018. (won the best paper award).
2. J. Douglas, B. Zimmerman, A. Kopylov, J. Xu, D. Sussman, **V. Lyzinski**, "Metrics for Evaluating Network Alignment," *GTA³ 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, Feb 9, 2018.
3. 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. IEEE, 2017.
4. **V. Lyzinski**, G. Sell, A. Jansen, "An Evaluation of Graph Clustering Methods for Unsupervised Term Discovery," *Proceedings of Interspeech*, Dresden, Germany, 2015.

Submitted Papers/Preprints

1. J. Arroyo, D. L. Sussman, C. E. Priebe, **V. Lyzinski**, "Maximum Likelihood Estimation and Graph Matching in Errorfully Observed Networks," arXiv 1812.10519, 2018.
2. D. E. Fishkind, L. Meng, A. Sun, C. E. Priebe, **V. Lyzinski**, "Alignment strength and correlation for graphs," arXiv 1808.08502, 2018.
3. 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," arXiv 1808:07801, 2018.
4. F. Fang, D. L. Sussman, **V. Lyzinski**, "Tractable Graph Matching via Soft Seeding," arXiv 1807.09299, 2018.
5. D. L. Sussman, **V. Lyzinski**, Y. Park, C. E. Priebe, "Matched filters for noisy induced subgraph detection," arXiv 1803.02423, 2018.
6. 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," arXiv 1802.04960, 2018.
7. **V. Lyzinski**, D. L. Sussman, "Matchability of heterogeneous networks pairs," arXiv 1705.02294, 2018.

8. H.G. Patsolic, Y. Park, V. Lyzinski, C.E. Priebe, “Vertex Nomination Via Local Neighborhood Matching,” arXiv:1705.00674, 2017.
9. 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.
10. 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.
11. A. Athreya, M. Tang, **V. Lyzinski**, Y. Park, B. Lewis, M. Kane, C. E. Priebe, “Numerical tolerance for spectral decompositions of random dot product graphs,” arXiv 1608.00451, 2016.
12. **V. Lyzinski**, S. Adali, J. Vogelstein, Y. Park, C. E. Priebe, “Seeded Graph Matching via Joint Optimization of Fidelity and Commensurability,” arXiv 1401.3813, 2014.

Conference Presentations and Invited Seminars

- “Graph matching in edge-independent networks.” Invited speaker, Boston University Statistics and Probability Seminar Series. October 11th, 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, 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 Statistical Science Seminar. September, 2017.
 - Invited speaker, University of Florida Department of Statistics Seminar. January, 2017.
 - Invited speaker, University of Maryland, Department of Mathematics Seminar. January, 2017.
 - Invited speaker, University of Massachusetts, Amherst; Department of Mathematics and Statistics Seminar. 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.”
 - Poster presentation and flash talk, The 2016 IMS New Researchers’ Conference. July, 2016.
 - Invited speaker, JHU Applied Mathematics and Statistics Department 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.
 - Invited speaker (joint with Minh Tang and Avanti Athreya), weekly seminar on networks organized by Peter Bickel. November, 2015.
- “The Cortical Column Conjecture and Related Connectomic Problems.” Invited 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.
- “Brain Graphs: Batch Effects and Clustering.” DARPA GRAPHS PI meeting/workshop. July, 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.”
 - Contributing speaker, Fields–MITACS Summer School in Applied Probability. May 2009.
 - Johns Hopkins University Department of Applied Mathematics and Statistics Student Seminar Series. March, 2009.

Teaching History

- *Instructor*, Department of Mathematics and Statistics, University of Massachusetts, Amherst

Developed syllabus and overall course structure; designed and implemented course curriculum; created exams and homework and administered all grades.

Courses taught:

Stat ST Statistical Network Inference; fall, 2018.

Stat 516 Statistics II; spring, 2018 (two sections).

- *Instructor*, Department of Applied Mathematics and Statistics, Johns Hopkins University

Developed syllabus and overall course structure; designed and implemented course curriculum; created exams and homework and administered all grades.

Courses taught:

550.621 Probability Theory II (graduate level); fall, 2016.

550.620 Probability Theory I (graduate level); fall, 2015.

550.771 The Probabilistic Method (graduate level); spring, 2014

550.310 Probability and Statistics for the Physical and Information Sciences and Engineering; fall, 2013

550.111 Statistical Analysis I; spring, 2013

550.310 Probability and Statistics for the Physical and Information Sciences and Engineering; fall, 2012

550.230 Introduction to Biostatistics; summer, 2012

550.310 Probability and Statistics for the Physical and Information Sciences and Engineering; fall, 2011

550.230 Introduction to Biostatistics; summer, 2011

550.310 Probability and Statistics for the Physical and Information Sciences and Engineering; spring, 2011

550.310 Probability and Statistics for the Physical and Information Sciences and Engineering; spring, 2010

550.171 Discrete Mathematics; summer, 2009

550.111 Statistical Analysis I; summer, 2008

- *Teaching Assistant*, Johns Hopkins University

Collaborated with faculty on curriculum development; independently developed and taught weekly section lectures and review sessions; graded homework and exams; individualized teaching plans for students as needed.

Courses TA'd in Applied Mathematics and Statistics:

- 550.621 Probability Theory II for Professor James Fill
- 550.362 Introduction to Optimization II for Professor Donniell Fishkind
- 550.692 Matrix Analysis and Linear Algebra for Professor Donniell Fishkind
- 550.385 Scientific Computing: Linear Algebra for Professor Youngmi Hur
- 550.111 Statistical Analysis I for Professor Nam Lee
- 550.361 Introduction to Optimization for Professor Beryl Castello
- 550.386 Scientific Computing: Differential Equations for Professor Greg Eyink
- 550.291 Linear Algebra and Differential Equations for Professor Fred Torcaso

Courses TA'd in Mathematics:

- 110.202 Calculus III for Professor Graeme Wilkin
- 110.109 Calculus II for Professor Julien Paupert

Awards and Fellowships

- PI on the following grants/awards
 - 2017–2021, "Universally Useful Primitives for Aligning Networks Across Time and Space," Defense Advanced Research Projects Agency, Modeling Adversarial Activity program. Co-PI's: Youngser Park, Carey E. Priebe, and Daniel Sussman.
- co-PI on the following grants/awards
 - 2017–2021, "What Would Tukey Do? <enter>," Defense Advanced Research Projects Agency, Data-Driven Discovery of Models program (PI: Carey Priebe).
 - 2018–2021, "A 5-dimensional connectomic approach to the neural basis of behavior," NIH Brain initiative: Exploratory Team-Research BRAIN Circuit Programs eTeam-BCP (PI: Paul Katz).
- GAANN Fellowship, U.S. Department of Education awarded through the Department of Applied Mathematics and Statistics, The Johns Hopkins University. 2009–2012.
- Counselman Endowed Fellowship, awarded by the Department of Applied Mathematics and Statistics, The Johns Hopkins University. 2008–2012.
- Naddor Endowed Teaching Fellowship, awarded by the Department of Applied Mathematics and Statistics, The Johns Hopkins University. 2007–2009.
- Graduate Student Travel Grant to the Joint Mathematics Meetings, Boston MA, January 4–7, 2012.

Ph.D. Dissertation Advising

- Heather Patsolic (co-advising with Carey E. Priebe), Ph.D. student, Department of Applied Mathematics and Statistics, Johns Hopkins University
 - Expected to graduate with Ph.D. Spring 2020
- Keith Levin (co-advising with Ben Van Durme and Carey E. Priebe), Ph.D. student, Department of Computer Science, Johns Hopkins University
 - Graduated with Ph.D. Spring 2017
 - currently a Postdoctoral Researcher at the University of Michigan, Department of Statistics

Professional Activities and Societies

- Program Co-chair (organizer), 2nd workshop on Graph Techniques for Adversarial Activity Analytics (GTA³ 2.0) in conjunction with the 2018 IEEE Big Data conference. December 10th, 2018.
- Co-organized (with Daniel L. Sussman) an Invited Session at the 2018 Joint Statistics Meetings on Recent Advances in Multiple Graph Inference.
- 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
- Member of the IMS Committee on New Researchers, serving 2016–2019.
- Served on program committee for 4th SIAM Workshop on Network Science, July 2016.
- 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.
- Served on three Johns Hopkins University Graduate Board Oral exam committees (Travis Wolfe, Pushpendre Rastogi and Jordan Yoder)
- Served on one Johns Hopkins University Ph.D. candidacy exam committee (Heather Patsolic)
- Served on five Johns Hopkins University dissertation defense committees (Li Chen, Henry Pao, Cencheng Shen, Jordan Yoder (served as Second Reader), Keith Levin)
- Refereed papers for the following journals: IEEE Transactions on Medical Imaging; Theory of Computing System; PNAS; IEEE Transactions on Pattern Analysis and Machine Intelligence; Annals of Statistics; Random Structures and Algorithms; Algorithms; ESAIM: Probability and Statistics; Computational and Applied Mathematics; Annals of Probability; Annals of Applied Probability; Electronic Journal of Probability; Involve, a Mathematics Journal; Probability in the Engineering and Informational Sciences; IEEE TNNLS; Markov Processes and Related Fields; Annales de l'institut Henri Poincare (Prob. and Stat.); Parallel Computing
- Member: ASA, IMS, Phi Beta Kappa