Minh Tang

Department of Statistics
North Carolina State University
2311 Stinson Dr, Raleigh, NC 27607
✉ *mtang8@ncsu.edu*
🖱 *minh-tang.github.io*

Education

2010 **Ph.D in Computer Science**,
Indiana University Bloomington.

2004 **M.S. in Computer Science**,
University of Wisconsin Milwaukee.

2001 **B.S. in Computer Science**,
Assumption University, Thailand.

Work Experience

07/19 – now **Assistant Professor**,
Department of Statistics, North Carolina State University.

01/17 – 06/19 **Associate Research Professor**,
Department of Applied Mathematics and Statistics, Johns Hopkins University.

07/14 – 12/16 **Assistant Research Professor**,
Department of Applied Mathematics and Statistics, Johns Hopkins University.

10/10 – 06/14 **Postdoctoral Fellow**,
Department of Applied Mathematics and Statistics, Johns Hopkins University.

Research Interests

statistical pattern recognition, dimensionality reduction, statistical inference on graphs

Funded Grants

08/22 – 07/25 sole PI on NSF DMS grant: Spectral methods for single and multiple graph inference

03/17 – 08/21 co-PI on DARPA Data-Driven Discovery of Models (PI: Carey Priebe)

08/18 – 08/19 PI on Microsoft Research Award: Efficiency and Optimality in Graph Inference

Journal Publications

2023+ X. Du and **M. Tang**. Hypothesis testing for equality of latent positions in random graphs. *Bernoulli*, accepted for publication. arXiv preprint link.

2022+ J. Koo and **M. Tang** and M. W. Trosset. Popularity adjusted block models are generalized random dot product graphs. *Journal of Computational and Graphical Statistics*, DOI link.

2022+ A. Athreya, Z.Lubberts, B. Lewis, V. Lyzinski, M. Kane, Y.Park, C. E. Priebe and **M. Tang**, Numerical tolerance for spectral decompositions of random matrices. *Journal of Computational and Graphical Statistics*, DOI link.

2022 R. Zheng and V. Lyzinski and C. E. Priebe and **M. Tang**. Vertex nomination between graphs via spectral embedding and quadratic programming. *Journal of Computational and Graphic Statistics*, Vol. 31, pp.1254–1268. DOI link.

2022 P. Rubin-Delanchy and J. Cape and **M. Tang** and C. E. Priebe. A statistical interpretation of spectral embedding: the generalised random dot product graph. *Journal of the Royal Statistical Society, Series B.*, Vol. 84, pp.1446–1473. DOI link.

2022   J. Chung and B. Varjavand and J. Arroyo-Relion and A. Alaykin and J. Agterberg and **M. Tang** and C. E. Priebe and J. T. Vogelstein, Valid two-sample graph testing via optimal transport Procrustes and multiscale graph correlation with applications in connectomics, *Stat*, Vol. 11. DOI link.

2022   **M. Tang** and J. Cape and C. E. Priebe. Asymptotically efficient estimators for stochastic blockmodels: the naive MLE, the rank-constrained MLE, and the spectral. *Bernoulli*, Vol. 28, pp. 1049–1073. DOI link.

2022   A. Athreya and J. Cape and **M. Tang**. Eigenvalues of stochastic blockmodel graphs and random graphs with low-rank edge probability matrices *Sankhya A*, Vol. 84, pp. 36–63 (Special Issue on Network Analysis). DOI link.

2021   K. Levin and F. Roosta and **M. Tang** and M. Mahoney and C. E. Priebe. Limit theorems for out-of-sample extensions of the adjacency and Laplacian spectral embeddings. *Journal of Machine Learning Research*, Vol. 22. DOI link.

2021   J. Vogelstein and E. Bridgeford and **M. Tang** and D. Zheng and C. Douville and R. Burns and M. Maggioni. Supervised Dimensionality Reduction for Big Data. *Nature Communications*, Vol. 12, article #2872. DOI link.

2021   A. Athreya and **M. Tang** and Y. Park and C. E. Priebe. On estimation and inference in latent structure random graphs. *Statistical Science*, Vol. 36, pp. 68–88. DOI link.

2020   G.-K. Li and **M. Tang** and N. Charon and C. E. Priebe. Central limit theorems for classical multidimensional scaling. *Electronic Journal of Statistics*, Vol. 14, pp. 2362–2394. DOI link.

2019   J. Cape and **M. Tang** and C. E. Priebe. On spectral embedding performance and elucidating network structure. *Journal of Network Science*, Vol. 7, pp. 269–291. DOI link.

2019   J. Cape and **M. Tang** and C. E. Priebe. The two-to-infinity norm and singular subspace geometry with applications to high-dimensional statistics. *Annals of Statistics*, Vol. 47, pp. 2405–2439. This paper was among 4 papers selected for presentation at the 2019 JSM Annals of Statistics Special Invited Sessions. DOI link.

2019   J. Cape and **M. Tang** and C. E. Priebe. Signal-plus-noise matrix models: eigenvector deviations and fluctuations. *Biometrika*, Vol. 106, pp. 243–250. DOI link.

2019   C. E. Priebe and Y. Park and J. T. Vogelstein and J. M. Conroy and V. Lyzinski and **M. Tang** and A. Athreya and J. Cape and E. Bridgeford. On a "two truths" phenomenon in spectral graph clustering. *PNAS*, Vol. 116, pp. 5995–6000. DOI link.

2018   **M. Tang** and C. E. Priebe. Limit theorems for eigenvectors of the normalized Laplacian for random graphs. *Annals of Statistics*, Vol. 46, pp. 2360–2415. DOI link.

2018   A. Athreya and D. E. Fishkind and K. Levin and V. Lyzinski and Y. Park and Y. Qin and D. L. Sussman and **M. Tang** and J. T. Vogelstein and C. E. Priebe, Statistical inference on random dot product graphs: a survey, *Journal of Machine Learning Research*, Vol. 18. DOI link.

2017   J. Cape, **M. Tang** and C. E. Priebe. The Kato-Temple inequality and eigenvalue concentration. *Electronic Journal of Statistics*, Vol. 11, pp. 3954–3978. DOI link.

2017   V. Lyzinski, **M. Tang**, A. Athreya, Y. Park and C. E. Priebe. Community detection and classification in hierarchical stochastic blockmodels. *IEEE Transactions on Network Science and Engineering*, Vol. 4, pp. 13–26. DOI link.

2017   **M. Tang**, A. Athreya, D. L. Sussman, V. Lyzinski, Y. Park and C. E. Priebe. A semiparametric two-sample hypothesis testing problem for random graphs. *Journal of Computational and Graphical Statistics*, Vol. 26, pp. 344–354. DOI link.

2017   **M. Tang**, A. Athreya, D. L. Sussman, V. Lyzinski, and C. E. Priebe. A nonparametric two-sample hypothesis testing problem for random dot product graphs. *Bernoulli*, Vol. 23, pp. 1599–1630. DOI link.

2016   S. Suwan, D. S. Lee, R. Tang, D. L. Sussman, **M. Tang** and C. E. Priebe. Empirical Bayes estimation for the stochastic blockmodel. *Electronic Journal of Statistics*, Vol. 10, pp. 761–782. DOI link.

2016   A. Athreya, V. Lyzinski, D. J. Marchette, C. E. Priebe, D. L. Sussman and **M. Tang**. A central limit theorem for scaled eigenvectors of random dot product graphs. *Sankhya Series A*, Vol. 78, pp. 1–18. DOI link.

2015   C. E. Priebe, D. L. Sussman, **M. Tang** and J. T. Vogelstein. Statistical inference on errorfully observed graphs. *Journal of Computational and Graphical Statistics*, Vol. 24, pp. 930–953. DOI link.

2014   V. Lyzinski, D. L. Sussman, **M. Tang**, A. Athreya and C. E. Priebe. Perfect clustering for stochastic blockmodel graphs via adjacency spectral embedding. *Electronic Journal of Statistics*, Vol 8, pp. 2905–2922. DOI link.

2014   C. Shen, M. Sun, **M. Tang** and C. E. Priebe. Generalized canonical correlation analysis for classification in high dimensions. *Journal of Multivariate Analysis*, Vol. 130, pp. 310–322. DOI link.

2014   D. L. Sussman, **M. Tang** and C. E. Priebe. Consistent latent position estimation and vertex classification for random dot product graphs. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 36, pp. 48–57. DOI link.

2014   H. Wang, **M. Tang**, Y. Park, and C. E. Priebe. Locality statistics for anomaly detection in time-series of graphs. *IEEE Transactions on Signal Processing.*, Vol. 62, pp. 703–717. DOI link.

2013   D. E. Fishkind, D. L. Sussman, **M. Tang**, J. T. Vogelstein, and C. E. Priebe. Consistent adjacency-spectral partitioning for the stochastic block model when the model parameters are unknown. *SIAM Journal on Matrix Analysis and Applications*, Vol. 34, pp. 23–39. DOI link.

2013   N. H. Lee, J. Yoder, **M. Tang** and C. E. Priebe. On latent position inference from doubly stochastic messaging activities. *Multiscale Modeling and Simulation*, Vol. 11, pp. 683–718. DOI link.

2013   M. Sun, C. E. Priebe and **M. Tang**. Generalized canonical correlation analysis for disparate data fusion. *Pattern Recognition Letters*, Vol. 34, pp. 194–200. DOI link.

2013   **M. Tang**, Y. Park, N. H. Lee and C. E. Priebe. Attribute fusion in a latent process model for time series of graphs. *IEEE Transactions on Signal Processing*, Vol. 61, pp. 1721–1732. DOI link.

2013   **M. Tang** and D. L. Sussman and C. E. Priebe. Universally consistent vertex classification for latent positions graphs. *Annals of Statistics*, Vol. 41, pp. 1406–1430. DOI link.

2012   D. L. Sussman, **M. Tang**, D. E. Fishkind and C. E. Priebe. A consistent adjacency spectral embedding for stochastic blockmodel graphs. *Journal of the American Statistical Association*, Vol. 107, pp. 1119–1128. DOI link.

Preprints (* denote former or current PhD advisees)

2022   R. Zheng and **M. Tang**, Limit results for distributed estimation of invariant subspaces in multiple networks inference and PCA. arXiv preprint link.

2022   Y. Zhang and **M. Tang**, Perturbation analysis of randomized SVD and its applications to high-dimensional statistics. arXiv preprint link.

2021   Y.-J. Chen and **M. Tang**, Classification of high-dimensional data with spiked covariance matrix structure. arXiv preprint link.

2021   Y. Zhang and **M. Tang**. Consistency of random-walk based network embedding algorithms. arXiv preprint link.

2020   J. Agterberg and **M. Tang** and C. E. Priebe. Nonparametric Two-Sample Hypothesis Testing for Random Graphs with Negative and Repeated Eigenvalues. arXiv preprint link.

2020   Y. Wang and S. Lahiri and **M. Tang**. Two-sample Testing on Latent Distance Graphs With Unknown Link Functions. arXiv preprint link.

2020   M. Trosset and M. Gao and **M. Tang** and C. E. Priebe. Learning 1-Dimensional Submanifolds for Subsequent Inference on Random Dot Product Graphs. arXiv preprint link.

2020   J. Agterberg and **M. Tang** and C. E. Priebe. On Two Distinct Sources of Nonidentifiability in Latent Position Random Graph Models. [arXiv preprint link](#).

Technical Reports

2017   R. Tang and **M. Tang** and J. T. Vogelstein and C. E. Priebe. Robust estimation from multiple graphs under gross error contamination. [arXiv preprint link](#).

2017   K. Levin and A. Athreya and **M. Tang** and C. E. Priebe and V. Lyzinski. A central limit theorem for an omnibus embedding of random dot product graphs. [arXiv preprint link](#).

2017   P. Rubin-Delanchy and C. E. Priebe and **M. Tang**. Consistency of adjacency spectral embedding for the mixed membership stochastic blockmodel. [arXiv preprint link](#).

2017   C. E. Priebe and Y. Park and **M. Tang** and A. Athreya and V. Lyzinski and J. T. Vogelstein and Y. Qin and B. Cocanougher and K. Eichler and M. Zlatic and A. Cardona. [arXiv preprint link](#).

2013   **M. Tang**, Y. Park and C. E. Priebe. Out-of-sample extension for latent position graphs. [arXiv preprint link](#). The publication by Levin et al. in JMLR was based on a part of this preprint.

Seminars and Invited Talks

10/2022   Operation Research Seminar, North Carolina State University.
11/2021   Department of Mathematics and Statistics, University of Massachusetts, Amherst.
12/2020   CMStatistics, London, UK.
04/2020   Department of Mathematics, University of Maryland
12/2019   CMStatistics, London, UK.
11/2018   Department of Biostatistics, Yale University.
09/2017   Department of Mathematics and Statistics, Boston University.
08/2017   Joint Statistical Meetings, Baltimore, MD, USA.
11/2015   Department of Statistics, Indiana University Bloomington.
02/2015   School of Industrial and Systems Engineering, Georgia Institute of Technology.
02/2015   Department of Statistics, Virginia Tech.
08/2014   Joint Statistical Meetings, Boston, MA, USA.
05/2012   Interface Symposia, Houston, TX, USA.

Teaching

NCSU   ST 371: Introduction to Probability and Distribution Theory (F22,S23)
NCSU   ST790: Statistical Inference on Graphs (F20, S22)
NCSU   ST 501: Fundamentals of Statistical Inference (F20, F21, F22)
NCSU   ST 421: Mathematical Statistics I (S20)
NCSU   ST 442: Introduction to Data Science (F19, F21)
JHU   Generalized linear mixed models & longitudinal data analysis (S17, S18, S19)
JHU   Professor Joel Dean Award for Excellence in Teaching (S16)
JHU   Topics in statistical pattern recognition (S16)
JHU   Applied statistics and data analysis (F13, F14, F15, F16, F17, F18)
JHU   Statistical learning and high-dimensional data analysis (S11)

Mentoring

NCSU   External PhD thesis co-advisor of John Koo at Indiana University Bloomington (2020 – present); co-advisor with Michael W. Trosset. Defense planned for January 2023.
NCSU   PhD thesis advisor of Xinjie Du (2019 – present); defense planned for Summer 2023.
NCSU   PhD thesis advisor of Yukun Song (2019 – present); defense planned for Summer 2023.

NCSU	PhD thesis advisor of Yichi Zhang (2019 – present); co-advisor with Shu Yang. Defense planned for Summer 2023.
NCSU	PhD thesis advisor of Runbing Zheng (2019 – present); defense planned for Summer 2023.
NCSU	PhD thesis advisor of Alex Chen (defended July 2022); Alex is currently a research scientist at Google.
NCSU	PhD thesis advisor of Yiran Wang (defended December 2021); co-advisor with Soumendra Lahiri; Yiran is currently a research scientist at Meta.
JHU	MS thesis advisor of Jipeng Zhang (graduated December 2019). Jipeng is currently a PhD student in Biostatistics at the University of Pittsburgh.
JHU	PhD thesis advisor of Gongkai Li (defended May 2019); co-advisor with Carey E. Priebe; Gongkai is currently an Analyst at SWaN & Legend Venture Partners.
JHU	MS thesis advisor of Erin Hunt (graduated May 2019). Erin is currently a data scientist at T. Rowe Price.
JHU	PhD thesis advisor of Joshua Cape (defended March 2019); co-advisor with Carey E. Priebe; Joshua is currently an Assistant Professor in the Department of Statistics at the University of Wisconsin, Madison.
JHU	MS thesis advisor of Fanwen Zhu (graduated July 2018). Fanwen is currently a PhD student in Economics at UCLA.

Professional Services

Refereed papers for *Annals of Statistics, Annals of Applied Statistics, Statistical Science, Journal of Computational and Graphical Statistics, IEEE Transactions on Signal Processing, IEEE Transactions on Network Science, Journal of the Royal Statistical Society, Series B., Electronic Journal of Statistics, Journal of Machine Learning Research, IEEE Transactions on Knowledge and Data Engineering, Bernoulli, Biometrics.*