Joshua Agterberg

July 2020

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https://jagterberg.github.io

Education

2017 - Present Johns Hopkins University
PhD in Applied Mathematics and Statistics
Master of Science in Engineering in Applied Mathematics and Statistics
Advised by Professor Carey Priebe

2013 - 2017 University of Wisconsin-Madison
Bachelor of Business Administration, Major in Actuarial Science and Mathematics
Advised by Professor Marjorie Rosenberg
GPA: 3.73/4.0, Actuarial Science Major GPA: 4.0/4.0
Graduated with Distinction

Research Interests

- Random Graph Inference
- Kernel Methods
- Spectral Perturbation Theory and Matrix Analysis
- High-dimensional Statistics
- Nonparametric Statistics

Preprints and Publications

1. *On Two Distinct Sources of Nonidentifiability in Latent Position Random Graph Models*
   Joshua Agterberg, Minh Tang, and Carey Priebe, Submitted, 2020.

2. *Spectral Graph Clustering via the Expectation-Solution Algorithm*
   Zachary Pisano, **Joshua Agterberg,** Carey Priebe, Daniel Naiman, Submitted, 2020.

3. *Vertex Nomination, Consistent Estimation, and Adversarial Modification*
   Joshua Agterberg, Youngser Park, Jonathan Larson, Chris White, Carey Priebe, and Vince Lyzinski, Under Revision, 2020.

4. *Social Determinant-Based Profiles of US Adults with the Highest and Lowest Health Expenditures Using Clusters*
   Fanghao Zhong, Margie Rosenberg, **Joshua Agterberg,** and Richard Crabb, Submitted, 2020.

5. *Cluster Analysis Application to Identify Groups of Individuals with High Health Expenditures*
   Joshua Agterberg, Fanghao Zhong, Richard Crabb, and Margie Rosenberg, Accepted to *Health Services and Outcomes Research Methodology*, 2020.

Working Papers

1. *Consistent Nonparametric Hypothesis Testing for Random Graphs with Negative or Repeated Eigenvalues*
   Joshua Agterberg, Mao Hong, Minh Tang, and Carey Priebe, In Progress, 2020.

Talks

8/6/2020	"Consistent Nonparametric Hypothesis Testing for Low Rank Random Graphs with Negative or Repeated Eigenvalues," *Joint Statistical Meetings*
4/7/2020	"Nonidentifiability and nonparametric random graph hypothesis testing," *MINDS Seminar*, JHU
1/28/2020	"On Two Distinct Sources of Nonidentifiability in Latent Position Random Graph Models," *Applied Math and Statistics Student Seminar,* JHU
4/23/2019	"Vertex Nomination, Consistent Estimation, Adversarial Modification," *Applied Math and Statistics Student Seminar,* JHU

Honors and Awards

2020-Present	Applied Mathematics and Statistics Apprentice Teaching Fellow
2019-2020	MINDS (Mathematical Institute of Data Science) Fellowship
2019-2020	Charles and Catherine Counselman Fellowship
Spring 2017	Graduated with distinction (top 20% of graduating business students)
Spring 2017	DW Simpson Scholarship
Fall 2016	Bicknell Scholarship
2013-2014	Arthur C. Nielsen Scholarship
2013	Directly Admitted to Wisconsin School of Business
2014-2017	Dean's list (>3.8 Semester GPA – achieved five separate times)

Teaching

Johns Hopkins University (Applied Mathematics and Statistics)

Summer 2020	Teaching Assistant for 553.310 Probability and Statistics for Vittorio Loprinzo
Fall 2019	Co-created a topics course in probability with another graduate student
Summer 2019	Instructor for Financial Mathematics Master's Program Statistics Review
Summer 2019	Teaching Assistant for 553.310 Probability and Statistics for Vittorio Loprinzo
Spring 2019	Teaching Assistant for 553.762 Nonlinear Optimization II for Professor Daniel Robinson
Fall 2018	Teaching Assistant for 553.730 Statistical Theory for Professor Carey Priebe
Summer 2018	Instructor for Financial Mathematics Master's Program Statistics Review

University of Wisconsin-Madison (Wisconsin School of Business, Risk and Insurance)

Spring 2017	Grader for ActSci 655 Health Analytics for Professor Margie Rosenberg
Fall 2016	Grader for ActSci 651 Life Contingencies II for Professor Paul Johnson
Spring 2016	Grader for ActSci 650 Life Contingencies I for Professor Margie Rosenberg

University of Wisconsin-Madison (School of Music)

Spring 2015-Spring 2017, Private Piano Instructor

Professional Experience and Service

Reviewer IEEE Transactions on Pattern Analysis and Machine Intelligence

Member ASA, IMS

JHU Served on committee of graduate students to meet with potential new JHU AMS faculty head.

Organized reading group on eigenvectors and random graph inference.

2018 - Present **Research Assistant**, Johns Hopkins University, Baltimore, MD

Research assistant to Professor Carey Priebe in the Applied Mathematics and Statistics Department.

2017 **Analytics Intern**, CNA Financial, Chicago, IL

Examined the predictive value of FDA data on losses for products and professional liability for medical devices.

Cleaned and edited FDA data to merge with internal data and Dun and Bradstreet data. Modeled losses in R using a GLM with Tweedie family and log-link to account for zero-inflation.

Created univariate with-without plots to examine effect of specific FDA variables on losses

2016 **Actuarial Intern**, CNA Financial, Chicago, IL

Developed a Markov Chain model for predicting the probability of payment for insurance claims given the current legal state.

Generated piecewise linear splines to implement time dependence of Markov Model.

2013 **Actuarial Intern**, CUNA Mutual Group, Madison, WI

Created spreadsheets from scratch to replicate GAAP and Statutory reserves results from PolySystems for equity-indexed annuity policies as a control for auditors.

Analyzed mortality experience study data in Excel by comparing actual to expected ratios with the proposed new table and helped management determine to use new table across all annuity products.

Research Activities

2019-Present `nonparGraphTesting` R Package

R package implementing the nonparametric hypothesis test studied in the forthcoming paper *Consistent Nonparametric Hypothesis Testing for Random Graphs with Negative or Repeated Eigenvalues*

Summer 2018 DARPA D3M Summer workshop

Implemented Python code for graph-related problems for the D3M (Data-Driven Discovery of Models) summer workshop in Arlington, VA, under the direction of Professors Youngser Park and Carey Priebe. Responsibilities included updating primitives (individual algorithms), editing pipelines (collections of algorithms), and submitting results for formal evaluation.

2017 - 2018 `iGraphMatch`

Wrote R code for splrMatrix object (a sparse plus low-rank matrix) for faster calculations and cheaper storage of centered adjacency matrices in the `iGraphMatch` R package under direction of Professors Daniel Sussman and Carey Priebe.

2016 - 2018 `catDist` R Package

Personal project implementing several different categorical dissimilarity measures for use with K-Medoids and spectral clustering methods.

Skills and Qualifications

Proficient in R, Java, Python, Linux, Git, C++ (Rcpp), Matlab, LaTeX, Microsoft Excel, and VBA

Actuarial exams passed: Exam P (July 2014); Exam FM (February 2015), Exam MFE (July 2016); Fulfilled Econ, Finance, and Statistics VEE