

Joshua Daniel Loyal

CONTACT

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Florida State University
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EDUCATION

Ph.D. Statistics August 2022
University of Illinois at Urbana-Champaign, Champaign, IL

M.S. Physics December 2016
Yale University, New Haven, CT

B.S. Physics and Mathematics May 2013
Duke University, Durham, NC

PROFESSIONAL EXPERIENCE

Assistant Professor, Department of Statistics August 2022 - Present
Florida State University, Tallahassee, FL

Data Scientist 2015 – 2018
DataRobot, Inc., Boston, MA

RESEARCH INTERESTS

Statistical Network Analysis; Dynamic and Multilayer Networks; Bayesian Methodology;
Statistical Computing; Data Science.

PUBLICATIONS

† indicates a trainee at FSU.
For more information, see [Google Scholar](#).

In Revision/Submitted/In Preparation:

Loyal, J.D. (2023+). Fast variational inference of latent space models for dynamic networks using Bayesian p-splines. [Preprint](#).

Loyal, J.D. and Chen, Y. (2023+). A spike-and-slab prior for dimension selection in generalized linear network eigenmodels. [Preprint](#).

Published/Accepted:

Loyal, J.D. and Chen, Y. (2023). An eigenmodel for dynamic multilayer networks. *Journal of Machine Learning Research*. 24(128):1–69. [Article](#).

Loyal, J.D. and Chen, Y. (2023). A Bayesian nonparametric latent space approach to

modeling evolving communities in dynamic networks. *Bayesian Analysis*. 18(1):49–77. [Article](#).

Loyal, J.D., Zhu, R., Cui, Y., and Zhang, X. (2022). Dimension reduction forests: Local variable importance using structured random forests. *Journal of Computational and Graphical Statistics*. 31(4):1104–1113. [Article](#).

Loyal, J.D. and Chen, Y. (2022). Discussion of “Co-citation and Co-authorship Networks of Statisticians”. *Journal of Business and Economics Statistics*. 40(2):497–498. [Article](#).

Loyal, J.D. and Chen, Y. (2020). Statistical network analysis: A review with applications to the coronavirus 2019 pandemic. *International Statistical Review*, 88(2):419–440. [Article](#).

Collaborative Research:

Fraterrigo, J.M., Chen, W., **Loyal, J.**, Euskirchen, E.S. (2024). Soil microenvironmental variation drives belowground trait variation and interacts with macroclimate to structure aboveground trait variation of arctic shrubs. *Journal of Ecology*. In press.

Cohen T., Golling, T., Hance, M., Henrichs, A., Howe, K., **Loyal, J.**, Padhi, S., and Wacker, J. G. (2014). SUSY Simplified Models at 14, 33, and 100 TeV Proton Colliders. *Journal of High Energy Physics*, 117. [Article](#).

Gershtein, Y., Luty, M., . . . , **Loyal, J.**, et al. (2013). New Particles Working Group Report of the Snowmass 2013 Community Summer Study. In Proceedings at *Community Summer Study 2013: Snowmass on the Mississippi (CSS2013)*. [Article](#).

Cohen, T., Golling, T., Hance, M., Henrichs, A., Howe, K., **Loyal, J.**, Padhi, S., and Wacker, J. G. (2013). A Comparison of Future Proton Colliders using SUSY Simplified Models: A Snowmass Whitepaper. In Proceedings at *Community Summer Study 2013: Snowmass on the Mississippi (CSS2013)*. [Article](#)

SOFTWARE

Loyal, J.D. (2023). “`splinetlsm`: Fast Variational Inference of Dynamic LSMs using Bayesian P-Splines.” [Github](#).

Loyal, J.D. and Chen, Y. (2021). “`multidynet`: An Eigenmodel for Dynamic Multilayer Networks.” [Github](#).

Loyal, J.D. and Chen, Y. (2020). “`dynetlsm`: MCMC inference for latent space models for dynamic networks.” [Github](#).

Loyal, J.D. and Zhu, R. (2021). “`drforest`: Dimension Reduction Forests.” [Github](#).

Loyal, J.D. (2020). “`sliced`: Scikit-learn compatible sufficient dimension reduction methods.” [Github](#).

FUNDING Title: Modeling social correlation and polarization in dynamic networks using correlated latent space models.
Agent: FYAP Program, FSU (CRC)
Role: PI; Status: Complete; Amount: \$20,000.

PRESENTATIONS **Invited Talks:**

- “A Spike-and-Slab Prior for Dimension Selection in Generalized Linear Network Eigenmodels.” South Dakota State University; Department of Mathematics and Statistics; Brookings, SD; February 2024.
- “Fast Variational Inference for Latent Space Models for Dynamic Networks using Bayesian P-Splines” *CMStatistics 2023*; Berlin, Germany; December 2023.
- “A Spike-and-Slab Prior for Dimension Selection in Generalized Linear Network Eigenmodels.” University of South Carolina; Department of Statistics; Columbia, SC; October 2023.
- “An Eigenmodel for Dynamic Multilayer Networks.” *MEGSA Seminar Series*; Tallahassee, FL; September 2023.
- “A Spike-and-Slab Prior for Dimension Selection in Generalized Linear Network Eigenmodels.” *ICSA 2023*; Ann Arbor, Michigan; June 2023.
- “Spike-and-Slab Priors for Dimension Selection in Latent Space Models for Static and Dynamic Networks.” *CMStatistics 2022*; London, UK; December 2022.
- “Dimension Reduction Forests.” *ICSA Applied Statistics Symposium*; Gainesville, FL; July 2022.
- “An Eigenmodel for Dynamic Multilayer Networks.” *Norton Lecture at the Bohrer Workshop in Statistics*; Urbana, IL; April 2022.
- “An Eigenmodel for Dynamic Multilayer Networks.” George Mason University; Department of Statistics; Online; January 2022.
- “An Eigenmodel for Dynamic Multilayer Networks.” University of Virginia, Department of Statistics; Online; January 2022.
- “An Eigenmodel for Dynamic Multilayer Networks.” University of Illinois at Chicago, Department of Mathematics, Statistics, and Computer Science; Online; January 2022.
- “An Eigenmodel for Dynamic Multilayer Networks.” Florida State University, Department of Statistics; Online; January 2022.
- “An Eigenmodel for Dynamic Multilayer Networks.” University of Connecticut, Department of Statistics; Online; January 2022.
- “An Eigenmodel for Dynamic Multilayer Networks.” Zicklin School of Business, Baruch College, Paul H. Chook Department of Information Systems and Statistics; Online; December 2021.

- “An Eigenmodel for Dynamic Multilayer Networks.” Syracuse University, Department of Mathematics; Online; December 2021.
- “An Eigenmodel for Dynamic Multilayer Networks.” University of Missouri, Department of Statistics; Columbia, MO; December 2021.
- “An Eigenmodel for Dynamic Multilayer Networks.” University of Texas at Dallas, Department of Mathematical Sciences; Online; December 2021.
- “Emergent Recursive Multiscale Interaction.” *Sandia – Illinois LDRD Student Virtual Poster Session*; Online; September 2021.

Contributed Talks:

- “A Spike-and-Slab Prior for Dimension Selection in Generalized Linear Network Eigenmodels.” *JSM 2023*; Toronto, Canada; August 2023.
- “An Eigenmodel for Dynamic Multilayer Networks.” *ICSA Applied Statistics Symposium*; Online; September 2021.
- “An Eigenmodel for Dynamic Multilayer Networks.” *Joint Statistical Meetings*; Online; August 2021.
- “An Eigenmodel for Dynamic Multilayer Networks.” *2021 ISBA World Meeting*; Online; July 2021.
- “An Eigenmodel for Dynamic Multilayer Networks.” *Statistical Inference for Network Models (SINM)*; Online; June 2021.
- “A Bayesian Nonparametric Latent Space Approach to Modeling Evolving Communities in Dynamic Networks.” *Joint Statistical Meetings*; Online; August 2020.
- “Quantifying Uncertainty in Random Forests.” *Statistics Journal Club*; Urbana, IL; October 2019.
- “Dimension Reduction Forests: Adapting to Local Subspaces with Random Forests.” *Statistics Graduate Student Lunchtime Seminar*; Urbana, IL; October 2019.
- “Efficient Local Kernel Estimation using Structured Random Forests.” *Joint Statistical Meetings*; Denver, CO; July 2019.
- “Latent Space Modeling of Relational Data.” *Statistics Journal Club*; Urbana, IL; February 2019.
- “Classifying Products Based on Images and Text.” *PyCon Ukraine*; Lviv, Ukraine; April 2017.
- “Classifying Products Based on Images and Text.” *PyData Meetup*; Chicago, Illinois; March 2017.

Contributed Posters:

- “Fast Variational Inference of Bayesian Latent Space Models of Continuous-Time Dynamic Networks.” *CRC First Year Assistant Professor Workshop*; Florida State University; Tallahassee, FL; September 2023.

TEACHING
EXPERIENCE

STA 5207: Applied Regression Methods
Fall 2022, Spring 2023, Fall 2023, Spring 2024

FSU

Graduate Students

- Xiangyu Wu, Ph.D. Student, Statistics Department, FSU

Graduate Students Mentored

- Guang Qiu, Ph.D. Student, Statistics Department, FSU

Essay Exam / Dissertation Committee Member

- Kai Deng (Statistics), Major Professor: Xin Zhang.
- Ke Han (Statistics), Major Professor: Adrian Barbu.
- Jiehang Li (Statistics), Major Professor: Jonathan R. Stewart

Undergraduate Honors in Major Supervisory Committee Member

- Eli Butters (Statistics and Computer Science), Faculty Director: Rongjie Liu.

Workshop Courses:

- Introduction to Data Science with Python ODSC, November 2015

Teaching Assistant:

- STAT 525: Computational Statistics UIUC, Spring 2021
- STAT 542: Statistical Learning UIUC, Fall 2018
- STAT 400: Statistics and Probability I UIUC, Spring 2018
- STAT 400: Statistics and Probability I UIUC, Fall 2017
- PHYS 165L: General Physics Laboratory: E&M Yale, Spring 2014
- PHYS 165L: General Physics Laboratory: Mechanics Yale, Fall 2013

SERVICE &
PROFESSIONAL
ACTIVITIES

Referee Service:

- Journal of the American Statistical Association: 2023 (2), 2022 (1), 2019 (1)
- Biometrika: 2023 (1), 2021 (1)
- Journal of Machine Learning Research: 2023 (2), 2022 (1)
- Journal of Computational and Graphical Statistics: 2024 (1), 2023 (2), 2019 (1)
- Annals of Applied Statistics: 2024 (1), 2023 (1)
- Statistica Sinica: 2021 (1)
- Computational Statistics and Data Analysis: 2023 (2)
- Biometrics: 2023 (1)
- Journal of Data Science: 2022 (1)
- Journal of Agricultural, Biological, and Environmental Statistics: 2023 (1)
- Statistics and Computing: 2020 (1)

Committee Service:

At Florida State University

- Organizing Committee for the 2024 Florida ASA Chapter Meeting, Fall 2023 – Present
- Statistics Department Graduate Student Admissions Committee, Fall 2023 – Present
- Bayesian Reading Group Organizer, Fall 2023
- Fall Picnic Committee, Department of Statistics, Fall 2022

At University of Illinois at Urbana-Champaign

- Ph.D. Student Invited Seminar Committee, 2020 – 2022
- Primary Grad Student Liaison to NISS, Fall 2021 – 2022
- Ph.D. Student Lunchtime Seminar Committee, Fall 2019 – Spring 2022

Miscellaneous Service:

At Florida State University

- Organized an invited session “Recent advances in Bayesian inference for network and tensor data” for the 2024 ICSA Applied Statistics Symposium.
- Organized an invited panel discussion on career development for the 2024 Annual Florida ASA Chapter Meeting.
- Organized the FSU Alumni Dinner at JSM 2023, August 2023

At University of Illinois at Urbana-Champaign

- Roundtable Panelist, Blackwell Summer Scholars Program, Summer 2021, Summer 2022
- Sloan Peer Mentor, Sloan UCEM Program, 2019 – 2020

HONORS &
AWARDS

Norton Prize for Outstanding Doctoral Thesis in Statistics, UIUC, 2021
Best Student Contributed Paper Award, 2021 ISBA World Meeting, 2021
Poster Award, ICSA Applied Statistics Symposium, 2021
Doctoral Student Leadership and Service Award, UIUC, 2020
Ranked as Excellent in Teaching, UIUC, Fall 2017, Spring 2018
Graduated Magna Cum Laude, Duke University, May 2013
Graduated with High Distinction in Physics, Duke University, May 2013
Silver Medal, The University Physics Competition, 2011

PROFESSIONAL
MEMBERSHIPS

American Statistical Association, Institute of Mathematical Statistics, International Society for Bayesian Analysis, International Chinese Statistical Association.