Trevor Harris

Contact

Department of Statistics
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Research Interests

Scientific machine learning for Climatology, Epidemiology, and their intersection. My ongoing work is developing methods methods for integrating and comparing climate model output, developing multi-scale learning algorithms for climate forecasting, using graph neural networks for spatiotemporal analysis, and developing causal inference and granger causal inference tools with deep neural networks. Past work includes functional data analysis methods for anomaly detection, changepoint detection, and spatiotemporal sequence comparisons.

Education

PhD Statistics 2016 – 2021
University of Illinois at Urbana-Champaign, Champaign, IL
Advisor: Dr. Bo Li
Thesis: *Functional Data Methods for Climatological Processes*

MS Statistics 2016 – 2018
University of Illinois at Urbana-Champaign, Champaign, IL

BS Mathematics 2010 – 2014
University of Florida, Gainesville, FL
Advisors: Dr. Murali Rao and Dr. Farid AitSahlia
Thesis: *Estimating an optimal stopping time policy for American options*

Research Experience

Assistant Professor, Department of Statistics 2021 – Present
Texas A&M University, College Station, TX

Research Assistant, Department of Statistics 2017 – 2021
University of Illinois, Champaign, IL
Advisor: Dr. Bo Li

Graduate Intern, Mission Algorithms R&S Summer 2018, 2019–2020
Sandia National Laboratories, Albuquerque, NM
Advisor: Dr. J. Derek Tucker

Teaching Experience

Instructor, Department of Statistics 2021 – Present
Texas A&M University, College Station, TX

–STAT 211: Principles of Statistics I
–STAT 438: Bayesian Statistics
–STAT 335: Principles of Data Science
–STAT 421: Machine Learning
–STAT 600: Reproducible computational statistics

Teaching Assistant, Department of Accounting   2017
University of Illinois, Champaign, IL

–ACCY 570: Data Analytics Foundations for Accountancy
–ACCY 571: Statistical Analyses for Accountancy

Teaching Assistant, Department of Statistics   2016 – 2017
University of Illinois, Champaign, IL

–STAT 400: Statistics and Probability I

Professional Experience

Assistant Professor, Department of Statistics   2021 – Present
Texas A&M University, College Station, TX

Product Modeling Analyst, Underwriting Research   2014 – 2016
GEICO, Washington D.C.

Awards and Honors

Horace W. Norton Prize for outstanding thesis research in Statistics	2021
Selected as one of nine students to represent the University of Illinois in the national competition for the Schmidt Science Fellows Program	2020
Selected to attend the NextProf Science Workshop (canceled due to Coronavirus)	2020
Honorable mention in the ICSA Midwest student poster competition	2019
UIUC Statistics Department's Leadership and Service award	2019
Awarded travel funding for the 2019 STATMOS Spatial Statistics Workshop	2019
UIUC List of Teachers Ranked as Excellent by Their Students	2016
Graduated *magna cum laude* at University of Florida	2014

Publications

Fimbres-Macias, J.P., **Harris, T.**, Hamer, S., Hamer, G.(2022) *Phenology and environmental predictors of Triatoma sanguisuga dispersal in east-central Texas, United States.* Accepted. Acta Tropica

Tonks, A., **Harris, T.**, Li, B. (2022) *Forecasting West Nile Virus with Graph Neural Networks: Harnessing Spatial Dependence in Irregularly Sampled Geospatial Data.* In revision. GeoHealth

Harris, T., Li, B., Ryan Sriver (2022) *Multi-model Ensemble Analysis with Neural Network Gaussian Processes.* Accepted. Annals of Applied Statistics. arXiv.

Wang, M., **Harris, T.**, Li, B. (2022) *Bayesian Changepoint Estimation for Spatially Indexed Functional Time Series.* Journal of Agricultural, Biological, and Environmental Sciences. arXiv.

Ringer J., Kadeethum, T., **Harris, T.**, Yoon, H (2022) *Machine Learning Applications for Estimation of Greenhouse Gas Emissions Using Multiple Satellite Images.* AGU Conference Proceeedings.

Carmody, D., Mazzarello, M., Santi, P., **Harris, T.**, Lehmann, S., Abbiasov, T., Dunbar, R., Ratti, C. (2022) *The effect of co-location on human communication networks.* Nature Computational Science. arXiv.

Harris, T., Li, B., Tucker, J. D. (2021) *Scalable Multiple Change Point Detection for Functional Data Sequences.* Environmetrics. arXiv.

Harris, T., Li, B., Steiger, N., Smerdon, J., Tucker, J. D., Narisetty, N. (2020). *Evaluating Proxy Influence in Assimilated Paleoclimate Reconstructions – Testing the Exchangeability of Two Ensembles of Spatial Processes.* Journal of the American Statistical Association. Article.

Harris, T., Tucker, J. D., Li, B., Shand, L. (2020). *Elastic Depths for Detecting Shape Anomalies in Functional Data.* Technometrics. Article.

Harris, T., Li, B. (2019). *Kriging.* Wiley Statsref: Statistics Reference Online, John Wiley & Sons Ltd. Article.

Funding

Software

fmci: R package for functional change point detection with the multiple changepoint isolation method Github.

elasticdepth: R package for computing elastic depths and identifying shape outliers. Github.

kstat: R package for the Kolmogorov-Depth statistic for testing if two functional distribution are different. Github.

extdepth: R package for computing the extremal depths for functional data. Github.

Keynote Talks

Multi-model Ensemble Analysis with Neural Network Gaussian Processes, ICDS, Santiago, Chile, Nov 2023

Invited Talks

Distributionally robust multi-model ensemble analysis with deep kernel learning, Brigham Young University, Provo, UT, Feb 2024

Distributionally robust multi-model ensemble analysis with deep kernel learning, Hunter College, NY, NY, Nov 2023

Distributionally robust Multi-model Ensemble Analysis, JSM, Toronto, Canada, Aug 2023

Multi-model Ensemble Analysis with Neural Network Gaussian Processes, EccoStat, Kyoto, Japan, July 2023

Multi-model Ensemble Analysis with Neural Network Gaussian Processes, SIAM GS23, Bergen, Norway June 2023

Multi-model Ensemble Analysis with Neural Network Gaussian Processes, ICSA, Ann Arbor, MI June 2023

Multi-model Ensemble Analysis with Neural Network Gaussian Processes, IISA, Golden, CO May 2023

Multi-model Ensemble Analysis with Neural Network Gaussian Processes, Notre Dame, South Bend, ID, Apr 2023

Multi-model Ensemble Analysis with Neural Network Gaussian Processes, IMSI, Chicago IL, Sept 2022

Multi-model Ensemble Analysis with Neural Network Gaussian Processes, JSM, Washington DC, Aug 2022

Multi-model Ensemble Analysis with Neural Network Gaussian Processes, NRC, Fairfax, Aug 2022

Multi-model Ensemble Analysis with Neural Network Gaussian Processes, ISBA, Montreal, June 2022

Sliced Elastic Distance for Climate Model Validation, ICSA, Gainesville, June 2022

Multi-model Ensemble Analysis with Neural Network Gaussian Processes, ATD, Fairfax, May 2022

Variational target encoding for climate model integration, JSM, Seattle, July 2021

Elastic depths for identifying shape anomalies in functional data, ISI WSC Virtual, July 2021

Conference Presentations

Variational target encoding for climate model integration, AGU Fall Meeting, San Francisco, Dec 2020

Variational target encoding for climate model integration, CISL Climate Informatics, Oxford, Sept 2020

Fast functional change point detection with total variation denoising, JSM, Philadelphia, July 2020

Evaluating proxy influence in assimilated paleoclimate reconstructions, ENAR 2020 Spring Meeting, Nashville, Mar 2020

Evaluating proxy influence in assimilated paleoclimate reconstructions, AGU Fall Meeting, San Francisco, Dec 2019

Evaluating proxy influence in paleoclimate reconstructions, ICSA Midwest Chapter Meeting, Chicago, Oct 2019

Elastic depths for identifying shape anomalies in functional data, 62nd World Statistical Congress, Kuala Lumpur, Aug 2019

Evaluating proxy influence in paleoclimate reconstructions, JSM, Denver, Aug 2019

Evaluating proxy influence in data assimilation algorithms, Bohrer Workshop (UIUC), Champaign, Nov 2018

Evaluating proxy influence in data assimilation based climate field, CISL Climate Informatics (NCAR), Boulder, Sept 2018

Evaluating proxy Influence and reconstruction skill in data assimilation based climate field reconstructions using extremal depth, Joint Statistical Meeting, Vancouver, July 2018

Other Presentations

Functional change point detection with non-negative matrix factorization, MARTIAN's Symposium, Sandia National Labs, July 2019

An introduction to non-negative matrix factorization, Intern Symposium, Sandia National Labs, June 2019

Identifying phase and amplitude extremes in functional data with elastic depth, Statistics Graduate Student Seminar (UIUC), Champaign, Mar 2019

Testing the exchangeability of two spatiotemporal processes with applications to data assimilation, Illinois Climate Seminar (UIUC), Champaign, Mar 2019

Identifying phase and amplitude extremes in functional Data with elastic depth, Sandia/UIUC Tech Talks (UIUC), Champaign, Sept 2018

Elastic depth for amplitude and phase in functional data, MARTIAN's Symposium, Sandia National Lab, July 2018

Elastic functional principal component regression, Intern Symposium, Sandia National Lab, July 2018

Professional Activities

Member: Design & Analytics Lab for Urban Artificial Intelligence (DAL) and the National Labs/Arts & Sciences Working Group.
Judge: TAMU Datathon 2021, Student Research Week 2022

Reviewer: Journal of the American Statistical Association, Journal of Multivariate Analysis, Technometrics, Environmetrics, Biometrics, Climate Informatics, Statistical Methods & Applications, Stat, Journal of Climate, Climate of the Past, Journal of Machine Learning Research

Membership: American Statistical Association (2016–Present), Institute of Mathematical Statistics (2019–Present), American Geophysical Union (2019–Present), International Chinese Statistical Association (2019–Present)

Service

Member: Grant Opportunities, Library & Web Site/Social Media committee	2021 – Present
Founding member: PhD Student Seminar series at UIUC	2018 – 2021
Founding member: Statistics Graduate Student Organization at UIUC	2017 – 2021
President: Statistics in the Community at UIUC	2017 – 2018

Tech

Programming: Python, R, SAS, SQL, C++/Rcpp, VBA, Bash