Jordan Schupbach

Statistics and Machine Learning Researcher and Software Developer

Bozeman, MT | jordans1882@gmail.com | (406) 600-2385 | jordanschupbach.us | github.com/jordanschupbach

Research Profile

Statistics and machine learning researcher developing rigorous, computationally practical methods for complex and high-dimensional data. Interested in bridging statistical theory, optimization, and scientific applications, with particular emphasis on reliable inference and principled quantification of uncertainty. Programming enthusiast with a strong interest in software development, scientific computing, and translating new methods into dependable software.

Research Interests

Statistical methodology	Functional data analysis; spatial statistics; point processes; topological data analysis; nonparametric statistics; hypothesis testing; optimal experimental design; uncertainty quantification; Bayesian statistics.
Computation and learning	Digital pathology; numerical optimization; statistical machine learning; manifold learning; neural networks; computer vision; simulation-based methods; scientific software development.

Education

Montana State University **Bozeman, MT**
Ph.D. in Statistics, Advisors: Mark Greenwood, John Sheppard, John Borkowski *May, 2026*
- Dissertation: "Point Process and Nonparametric Modeling for Topological Data Analysis."
- Relevant focus: digital pathology, topological data analysis, machine learning, optimization, nonparametric statistics, spatial statistics, functional data analysis, mixed-effect models and hypothesis testing.

Montana State University **Bozeman, MT**
M.S. in Statistics, Advisor: John Borkowski *May 2016*
- Writing Project: "Particle Swarm Optimization for Optimal Experimental Design"

Montana State University **Bozeman, MT**
B.S. in Mathematics *May 2014*

Montana State University **Bozeman, MT**
B.S. in Economics *May 2014*

Research Experience

Research Assistant **June 2022–Present**
NISL Research Group, Montana State University *Bozeman, MT*
- Lead developer/researcher on Navy funded STTR Grant.
- Managed/mentored graduate research assistants.
- Wrote software for conducting inference with Bayesian Networks and Continuous Time Bayesian Networks for automated testing systems.
- Backend algorithmic and performance optimization engineering (Java, C#, C++).
- Frontend application development (Java, C#, C++ and Javascript (React/Electron)).
- Wrote proposals and grant reports.

Research Assistant **September 2017–June 2022**
QuBBD/CompTaG Research Group, Montana State University *Bozeman, MT*
- Designed and implemented methods combining topological data analysis and computer vision methods for automated grading of histopathology image data of prostate cancer.
- Communicated results through research papers, technical reports, presentations, and maintainable research software.

Research Assistant **September 2016–September 2017**
Statistical Consulting Center (SCRS) *Bozeman, MT*
- Conducted statistical consulting for graduate students and faculty at Montana State University.
- Communicated results through technical reports.
- Developed SoP for consulting practices.

Research Assistant **September 2010–September 2014**
Sustainable Oils LLC. *Bozeman, MT*
- Gathered/curated lab and field data for plant breeding research.
- Conducted mixed-effect modeling and PCA for morphological prediction.

Lab and Book Club Member **September 2017–May 2026**
Computational Geometry and Topology (CompTaG Research Lab) *Bozeman, MT*
- Read research papers/books and presented on topics in Computational Geometry and Computational Topology
- Participated in collabortive research

Lab Member **September 2017–May 2026**
Numerical Intelligent Systems Lab (NISL) *Bozeman, MT*
- Read research papers/books and presented on topics in Machine Learning

Lab Member **September 2019–May 2020**
Graduate Mathematics Seminar *Bozeman, MT*
- Read research papers/books and presenting on topics in Differential Geometry and Topology

Selected Publications and Preprints

1. E. Ginsberg, **J. Schupbach**, J. Sheppard, and N. Turk. "Applying Factored Evolutionary Algorithms to the B-Spline Knot Selection Problem." *2025 IEEE Symposium Series on Computational Intelligence (SSCI), pp. 21–25, 2025.*

2. B. Holmgren, E. Quist, **J. Schupbach**, B. T. Fasy, and B. Rieck. "The Manifold Density Function: An Intrinsic Method for the Validation of Manifold Learning." *arXiv:2402.09529, 2024.*

3. **J. Schupbach**, E. Pryor, K. Webster, and J. Sheppard. "A Risk-Based Approach to Prognostics and Health Management Combining Bayesian Networks and Continuous-Time Bayesian Networks." *IEEE Instrumentation & Measurement Magazine, vol. 26, no. 5, pp. 3–11, 2023.*

4. **J. Schupbach**, E. Pryor, K. Webster, and J. Sheppard. "Combining Dynamic Bayesian Networks and Continuous Time Bayesian Networks for Diagnostic and Prognostic Modeling." *2022 IEEE AUTOTESTCON, pp. 1–8, 2022.*

5. **J. Schupbach**, J. W. Sheppard, and T. Forrester. "Quantifying Uncertainty in Neural Network Ensembles Using U-Statistics." *2020 International Joint Conference on Neural Networks (IJCNN), pp. 1–8, 2020.*

6. R. L. Belton, B. T. Fasy, R. Mertz, S. Micka, D. L. Millman, D. Salinas, A. Schenfisch, **J. Schupbach**, and L. Williams. "Reconstructing Embedded Graphs from Persistence Diagrams." *Computational Geometry, vol. 90, article 101658, 2020.*

7. P. Lawson, **J. Schupbach**, B. T. Fasy, and J. W. Sheppard. "Persistent Homology for the Automatic Classification of Prostate Cancer Aggressiveness in Histopathology Images." *Proceedings of SPIE, vol. 10956, 2019.*

8. B. T. Fasy, E. Quist, A. Schenfisch, **J. Schupbach**. "A Generative Model for Simulating Prostate Cancer Nuclei." *In Manuscript.*

9. J. Borkowski, M. Greenwood, B. T. Fasy, **J. Schupbach**, J. Sheppard. "Mixed-curve Modeling for Repeated Measures Topological Data Analysis." *In Manuscript.*

10. J. Borkowski, M. Greenwood, **J. Schupbach**, J. Sheppard. "Mixed-Effect Hypothesis Testing for Repeated Measures Functional Data." *In Manuscript.*

11. J. Borkowski, M.Greenwood, **J. Schupbach**, J. Sheppard. "Modeling and Model Selection with Hierarchical P-splines." *In Manuscript.*

Selected Projects

Datamunge **github.com/jordanschupbach/datamunge**
C++, with bindings to R, Python, Java, C#, JavaScript, and more
- A library implementing data structures, methods and algorithms for data science in C++ automatically binding the API to over 10 different binding languages using SWIG.

pyFEA **github.com/jordanschupbach/pyFEA**
Python
- A python library implementing Factored Evolutionary Algorithm (FEA).

MEP **github.com/jordanschupbach/mep**
C++
- An all-in-one IDE for writing code, doing literate programming, AI assisted development, and more.

MEP.nvim **github.com/jordanschupbach/mep.nvim**
Lua
- A neovim configuration/plugin/distribution implementing popular neovim plugin features, including a fuzzy file finder, a fuzzy symbol finder, and an AI assisted code completion engine, and much more.

MEP-wm **github.com/jordanschupbach/mep-wm**
C++
- A project centric window manager with manual and dynamic window management.

mixedcurve **github.com/jordanschupbach/mixedcurve**
R
- An R library implementing mixed curve models and Westfall-Young p-values for local/global hypothesis testing.

Teaching and Mentoring

Teacher, Pre-calculus (M161) **2015**
Mathematics Department, Montana State University *Bozeman, Montana*

Teacher, Introductory Statistics (STAT216) **2015-2016**
Mathematics Department, Montana State University *Bozeman, Montana*

Teacher, Intermediate Statistics (STAT217) **2017**
Mathematics Department, Montana State University *Bozeman, Montana*

Teaching Assistant, Introductory Statistics (STAT412) **2017**
Mathematics Department, Montana State University *Bozeman, Montana*

Teaching Assistant, Principles and Methods in Machine Learning (605.649) **2022**
Computer Science Department, John's Hopkins University *Baltimore, Maryland*

Departmental Reading Program **2019-2020**
Mathematics Department, Montana State University *Bozeman, Montana*
- Mentored undergraduate students by reading books in statistics and meeting weekly to discuss.

Research Experience for Undergraduates (REU) Program **Summers 2022-2025**
Computer Science Department, Montana State University *Bozeman, Montana*
- Mentored undergraduate students through research projects with one resulting in publication

Technical Skills

Core languages	C++, C#, Java, JavaScript, R, Python
Additional exposure	D, Fortran, Lisp, Lua, OCaml, Perl, PHP, Ruby, Tcl, and more
Methods	Statistical inference, Bayesian computation, optimization, machine learning, simulation studies, experimental design, reproducible research
Development	Scientific computing, software design, testing, Git, Linux/MacOS/Windows, Nix, Kubernetes, PyTorch, TensorFlow, high-performance computing, literate programming, reproducible workflows

Honors and Service

Oscar Sepp Best Student Paper at IEEE AUTOTESTCON 2022

Reviewer for various conferences and journals, including: La Matematica, SIGSPATIAL, JoCG, SoCG, CCCG, PLOS Computational Biology, IJCNN, ESA 2018–Present