Ethan Ancell

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Education

University of Washington — Seattle, WA
Ph.D. in Statistics — Sep 2022–Jun 2027 (Expected)

Utah State University — Logan, UT
B.S. in Mathematics and Statistics — Aug 2018–May 2022

Publications

[1] **E. Ancell**, C. Bennett, B. Debusschere, S. Agarwal, P. Hays, and T. P. Xiao, "An out-of-distribution discriminator based on Bayesian neural network epistemic uncertainty", *arXiv preprint arXiv:2210.10780*, 2022.

[2] **E. Ancell** and B. Bean, "Autocart–spatially-aware regression trees for ecological and spatial modeling", *arXiv preprint arXiv:2101.08258*, 2021.

Work Experience

Research and Development Intern — Albuquerque, NM
Sandia National Laboratories (Advisors: T. Patrick Xiao and Christopher Bennett) — Jun 2023 - Sep 2023

- Designed simulations to compare methods for signal detection, including a comparison between theoretically derived optimal detectors and neural network based approaches
- Created a novel method for signal detection based upon a approximate likelihood ratio method using kernel density estimation and demonstrated better performance when compared against neural network approaches

Research Assistant — Seattle, WA
Department of Statistics, University of Washington (Advisor: Daniela Witten) — Sep 2022 - Jun 2023

- Provided statistical consulting for investigators involved with the University of Washington Center of Excellence in Neurobiology of Addiction, Pain, and Emotion
- Developed methods to conduct valid inference on regression relationships between neural data and behavior in in neuroscience experimental trails

Research and Development Intern — Livermore, CA
Sandia National Laboratories (Advisors: Bert Debusschere and T. Patrick Xiao) — May 2022 - Aug 2022

- Wrote a first-author paper covering a method for out-of-distribution detection using Bayesian neural network epistemic uncertainty
- Trained Bayesian neural networks with Tensorflow for computer vision regression tasks with military and government applications

Research Intern — Logan, UT
Utah Climate Center (Advisor: Brennan Bean) — Summer 2021

- Implemented and researched statistical methods for a sub-seasonal high-resolution soil moisture forecasting platform
- Used R and Python code to automate the estimation of volumetric soil moisture at a 2-kilometer resolution at 6-hourly intervals using the University of Utah's Center for High Performance Computing platform
- Implemented a testing process to select an optimal spatial statistics model for use in the forecasting platform, including linear models, random forests, and generalized additive models with splines on the sphere

Other Research Projects

Ensemble Kernel Density Estimation   Nov 2020 - Current

Faculty Mentor: Kevin Moon (Utah State University)

- Adapted existing ensemble estimation theory for entropy and information divergence estimation to kernel density estimation.
- Showed quick asymptotic convergence of an ensemble estimator for kernel density estimation using a carefully constructed constrained optimization problem to select weights.
- Created a Python software implementation for the ensemble estimator, demonstrating superior cross-validated performance results on several simulated datasets.

Autocart: Regression Trees for Spatial Modeling   Jun 2020 - Current

Faculty Mentor: Brennan Bean (Utah State University)

- Researched a modification to the regression tree objective function that better handles spatial autocorrelation and spatial compactness.
- Created an R package for the model and published the R package on the official R repository CRAN.
- Demonstrated improvements in cross-validated checks of predictive accuracy on several spatial datasets when using autocart over regression trees.

Deep and Shallow Learning Models for NLP of Tweets   Jan 2020 - May 2020

Faculty Mentor: Adele Cutler (Utah State University)

- Researched methods for classifying the sentiment of a tweet as a reference to a real-life disaster or in a figurative context.
- Trained deep learning models in both Python and R.
- Explored methods of text vectorization, including simple bag of words and pre-trained word embeddings such as GloVe vectorization and bidirectional word encodings such as BERT.
- Compared performance of methods like support vector machines and random forests with recurrent neural network structures.

Invited Seminars and Presentations

- Ancell, E., & Witten, D. (2023, April). Determining statistical significance in behavioral-neural activity linear models. Invited seminar presented to the University of Washington Center of Excellence in Neurobiology, Addiction, Pain, and Emotion. Hosted virtually.

- Ancell, E. (2022, April). Ensemble kernel density estimation. Poster session presented at the National Conference for Undergraduate Research, hosted virtually.

- Ancell, E., & Bean, B. (2021, August). Autocart: spatially aware regression trees for ecological and spatial modeling. Poster session presented at Joint Statistical Meetings, hosted virtually.

- Ancell, E., & Moon, K. (2021, April). Ensemble kernel density estimation. Poster session presented at USU Student Research Symposium, hosted virtually.

- Ancell, E. (2021, February). Autocart: spatially aware regression trees for ecological and spatial modeling. Poster session presented at Utah Research on Capitol Hill, hosted virtually.

- Ancell, E. (2020, December). Autocart: spatially aware regression trees for ecological and spatial modeling. Poster session presented at: USU Fall Student Research Symposium, hosted virtually.

- Ancell, E. (2020, October). Autocart: spatially aware regression trees for ecological and spatial modeling. Poster session presented at SIAM Northern States Section Student Chapters Conference, hosted virtually.

Teaching

- **Teaching Assistant** at USU   Spring 2021
  Modern Regression Methods (STAT 5100)
- **Recitation Leader** at USU   Fall 2019, Spring 2020, Fall 2020
  Introduction to Statistics with Elements of Algebra (STAT 1045)

Awards and Scholarships

- USU College of Science Scholar of the Year   2021–2022
- Barry M. Goldwater Scholarship   2021
- USU Peak Research Fellowship   Summer 2020
- USU Undergraduate Research and Creative Opportunities Grant   Summer 2020
- Robert and Christi Heal Scholarship   2020–2021
- USU Math/Statistics Recitation Leader of the Year   2018–2020
- USU Dean's Admission Scholarship   2018

Skills

- **R and RStudio:** 4 years of experience.
- **Scientific Python Stack:** 3 years of experience.
- **Java:** 6 months of experience.
- **Tensorflow:** 6 months of experience.

Volunteering and Mentoring

- Mentor for the Undergraduate Directed Reading Program (UW Department of Statistics)
  Mentee / Project Titles:
  - Abigal Cummings –*Information Theory*   Autumn 2023
  - Janice Kim –*Classical Papers in Statistics*   Spring 2023
  - David Ye –*Statistics in Neuroscience*   Winter 2023
- Reviewer for UW Department of Statistics Pre-Application Review Service   Autumn 2022, Autumn 2023
- USU Data Science Club President   Aug 2021–May 2022

Professional Membership

- American Statistical Association   Jun 2021–Current