

Nikolai Vetr

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Education PhD

2020

University of California, Davis
GPA: 4.0/4.0, Anthropology, Population Biology, Data Science & Informatics

BA

2013

Vanderbilt University
Earth & Environmental Sciences; Ecology, Evolution & Organismal Biology
GPA 3.9/4.0, Departmental Honors, *summa cum laude*

Projects

Dissertation Work

- Developed and implemented more efficient algorithms for computing phylogenetic likelihoods, mixing over high-dimension correlation matrices, and modularizing particular matrix operations under multivariate Brownian diffusion models of character evolution.
 - Reducing runtime for a typical analysis from weeks to hours
- Extended these models to discrete characters under the multivariate probit and explored their approximation in the context of truncated biogeographic dispersal.
- Applied these methods empirically to modern human, catarrhine, and fish datasets, also investigating their performance through extensive simulation experiments.

Recent Personal Projects

I've developed, fit, interpreted, described, and visualized results from:

- high-dimensional multilevel generalized linear mixed models (GLLMs) in Stan to heart transplant patient immune response data for time-series classification of rejection risk using non-HLA antigens straddling an acute rejection episode.
- multilevel GLMMs in Stan to consumer dietary and attitudinal response datasets measuring the effects of exposure to an advertisement advocating dietary change.
- a multilevel univariate Ornstein-Uhlenbeck model in Stan to the 'evolution' of nitrogen concentrations in manure ponds across California to predict values after an arbitrary amount of time has passed in an arbitrary pond.
- an efficient, conditional multivariate probit model in R that provides personalized movie rating predictions by exploiting basic properties of Schur complements.
- many dozens of minor scripts (< 100 LOC) devoted to data visualization, text mining, web scraping, replicating published analyses or algorithms from scratch, and exploring off-the-cuff ideas proposed by myself or colleagues.

Skills

Technical:

- Generalized Linear Models (e.g. spline, probit, Gaussian process, robust, etc.)
- Principle Components Analysis
- Missing Data Imputation
- Monte Carlo Methods
- Random Forests
- Diffusion Processes
- Support Vector Machines
- Model Comparison (e.g. cross-validation, information theoretic, marginal likelihood)
- Neural Networks
- Expectation-Maximization
- Natural Language Processing
- Markov Chains (CTMC / DTMC)
- Measurement Error Modeling
- Linux / macOS / Windows

Other: Science Communication, Teaching, Hitchhiking, Public Speaking, Backpacking, Data Visualization, Computer Assembly & Repair, Universal Design, Photography, Image Editing

Languages

Programming: R, RevBayes, Stan, BASH, Python, C++
Natural: Russian, English, Spanish

Leadership	Founder & Lead , Applied Bayesian Statistics Research Cluster	2019 - 2020
	– Founded, coordinated, and supervised an interdisciplinary research cluster of 70+ scientists and statisticians across numerous career stages (PhD Student, Postdoc, PI, Industry Researcher).	
	– Financially and spiritually sponsored by <i>Data Science & Informatics</i> .	
	Coordinator , Various Reading Groups	2014 - 2020
	– Founded and coordinated groups on Python, Linear Algebra, Bayesian Data Analysis, and Deep Learning, frequently consulting on each.	
	– Co-ran reading groups on Computational Molecular Evolution, Paleoanthropology, Quantitative Genetics, and Machine Learning.	
Teaching	Associate Instructor , UC-Davis	2015 - 2020
	– Taught three quarters of an upper-division paleoanthropology course, two quarters of an upper-division evolutionary primatology course, and one quarter of an introductory course on human evolution.	
	– Created or modified lab and lecture materials, designed and graded the assignments and tests, mentored students, delivered lectures, and supervised teaching assistants.	
	Teaching Assistant , UC-Davis & Vanderbilt University	2012 - 2020
	– TA'd for the above, as well as the lab for an introductory cell biology course at Vanderbilt.	
	– Designed and supervised labwork and lab-related assessments.	
	Outreach Lecturer , UC-Davis	2013 - 2020
	– Gave multiple yearly talks on human evolution to elementary and middle school students on location and visiting UC-Davis and during campus-wide events (e.g. <i>Picnic Day</i>).	
	– Volunteered for various workshops targeted at adults, e.g. to medical professionals on Natural Language Processing during UC-Davis Data Science Health Day.	
	Course Coordinator , Workshop in Applied Phylogenetics	2019
	– Served as a course coordinator for a world-renowned, widely-attended, week-long workshop in applied computational Bayesian phylogenetics at the Bodega Marine Laboratory.	
	Carpentries Instructor , Data & Software Carpentries	2019
	– Completed Instructor Training and Checkout for The Carpentries organization. Integrated techniques learned into my own teaching on e.g. Bayesian statistics & phylogenetics.	
Field & Labwork	Archaeological / Paleontological Excavator	2013
	Helped in excavation efforts at La Ferrassie, a Neandertal fossil and artifact dig site.	
	Paleoecologist	2012 - 2013
	Examined how ecological and environmental conditions were recorded in enamel stable isotope ratios and dental microwear textures for marsupial taxa across Australasia.	
	Water Quality Analyst	2011
	Analyzed water quality across a large set of streams in the North Island of New Zealand.	
Grants & Awards	1st Place Picnic Day Exhibit Award in “Secrets of Nature” Category	2017
	Outstanding Graduate Student Teaching Award Nomination	2016, 2019
	UC-Davis Summer Research Grant (\$3k)	2014, 2015
	NSF Graduate Research Fellowship (\$152k)	2015
	Graduate Scholars Fellowship (\$56k)	2013
	Conference Travel Award (\$500)	2012, 2018
	Eugene H. Vaughan Undergraduate Research Assistantship in Geology (\$13k)	2012
	Vanderbilt Undergraduate Summer Research Grant (\$5k)	2012
	Ross Family Scholarship (\$60k)	2012
	National Merit Scholarship (\$20k)	2009