Chase Van Amburg

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Education

Harvard University **Cambridge, MA**

Bachelor of Arts in Integrative Biology | Minor: Computer Science Aug 2020 – May 2024
Master of Science in Applied Mathematics Sep 2023 – May 2024

- AB GPA: 3.96 | SM GPA: 4.00
- Relevant Courses: Data Science I, Advanced Practical Data Science: MLOps, Machine Learning, Decision Theory, Scientific Computing: Numerical Methods, Theory of Neural Computation, Physical Mathematics I, Mathematical Biology: Evolutionary Dynamics, Contemporary Developing Countries

Professional Experience

Climate Adaptation in South Asia Cluster **Cambridge, MA**
Researcher in Human Response to Climate April 2023 – Present

- Designed complex data scrapers to augment a database of environmental data in collaboration with CrisisReady and Harvard Dataverse (Climateverse)
- Launched a collaboration with the largest self-employed women's union in the world to study microclimatic variations across Ahmedabad and nearby regions

Naomi Pierce Lab **Cambridge, MA & Laikipia, Kenya**
Researcher in Ecosystem Response to Climate Dec 2021 – Present

- Studied plant physiology in response to increased rates of wildfire in East Africa
- Characterized the thermal properties of acacia trees and their resilience to variation in local climate conditions
- Tracked changes in ant-plant biodiversity due to shifting microenvironmental conditions
- Adapted a coupled energy-balance model to quantify the relationship between ambient temperature and temperature within acacia

Michael Desai Lab **Cambridge, MA**
Researcher in Experimental Evolution May 2021 – Mar 2022

- Performed genetic transformations of non-model yeast for competitive fitness assays

Dave Johnston Lab **Cambridge, MA**
Researcher in Isotope Geochemistry Jan 2021 – May 2021

- Surveyed dozens of scientific articles on the topic of isotope fractionation process and relevant methods of data analysis
- Ran various statistical analyses on noisy datasets describing mass-dependent differentiation of sulfur isotopes from the Great Oxidation Event (2.7 Ga)

Teaching **Remote & Cambridge, MA**

Tutor/Course Assistant/Teaching Fellow Mar 2020 – Present

- Teaching fellow and project manager for graduate capstone course involving the development of a semester-long machine learning and computational science research project (Fall 2023)
- Head teaching fellow for a graduate course on evolutionary dynamics (Fall 2022)
- Course assistant and lab assistant for Integrated Science, an intensive first-year course on understanding biology through quantitative approaches (Fall 2021 – Present)
- Volunteer tutor through Mentors United for Change and Cambridge After-School Program (Spring 2020 – Summer 2021)

Research & Projects

Machine Learning – The Nature Conservancy **Cambridge, MA & Channel Islands, CA**

Conservation & Machine Learning [Weiwei Pan] August 2023 – Present

- Designed two machine learning research projects alongside The Nature Conservancy
- Managed two graduate student research teams studying the generalization of computer vision models used to detect invasive species caught in camera traps
- Managed one graduate student research team studying the distribution of agricultural plastics in California through classical ML models trained on satellite data
- 3 publications in progress

AI Generation of Educational Materials from Lecture Audio **Cambridge, MA**

Machine Learning August 2023 – Present

- Constructed an end-to-end ML pipeline which takes lecture videos as input, transcribes them with a Jax implementation of OpenAI's whisper, performs keyword extraction using a BERT transformer, and outputs educational material using OpenAI's API to access ChatGPT

Characterizing Occupational Microclimate – SEWA **Gujarat, India & Cambridge, MA**

Climate & Public Health [Satchit Balsari, Caroline Buckee, Peter Huybers] April 2023 – Present

- Deployed microclimate sensors throughout Ahmedabad and nearby regions in Gujarat to build data-based evidence that individuals of different occupations and socioeconomic status experience wildly different climatic regimes due to fine spatial scale variations
- Worked alongside and interviewed members of SEWA (Self-Employed Women's Association) to understand local effects of changing climate and climate-induced migration
- Presented results to an early-stage NIH P20 application group, multiple Harvard institutes, and administrators of NGOs from across South Asia
- 1 publication in progress

Data Scientific Approaches to Understand Ant-Plant Diversity **Cambridge, MA & Laikipia, Kenya**

Climate & Modeling [Naomi Pierce] May 2022 – Present

- Spent 2 months collecting biodiversity data and environmental time series at Mpala Research Centre
- Combined geotagged biodiversity data with LiDAR point representations of tree canopies to identify acacia symbionts given only canopy information
- 1 publication under review, 1 publication in progress

Distribution of Ethnicities Across Harvard Majors **Cambridge, MA**

Data Visualization October 2023

- Processed data from the Department of Education (National Center for Education Statistics IPEDS) on ethnicity for each degree category (major)
- Created a robust interactive where users can view the data in a variety of formats to better understand the skewed diversity across departments and student experiences at Harvard

- Designed code prioritizing modularity and efficiency to allow for data subsetting, custom visualization modifications, and usage with data from any college
- Aim to publish the interactive through Harvard by year's end

Deep Learning Classification of Peacock Calls **Cambridge, MA**
Machine Learning April 2023

- Modified the deep architecture from Weitao Xu et al. 2020 along with classical audio processing methods to classify the presence of peacock calls in audio samples with over 95% accuracy

Hierarchical Graph Model of Viral Dynamics **Cambridge, MA**
Data Visualization & Modeling December 2022

- Compared and contrasted differential equations and hierarchical graph models to describe COVID dynamics
- Fit parameters of differential systems on data from the Massachusetts Bureau of Infectious Disease and Laboratory Sciences
- Extended the hierarchical SIR model from Rader et al. 2020 to the more descriptive SEIRS model, and demonstrated a significant increase in accurate trajectory for the simulation with a category for exposed individuals

Continuous Extensions of Discrete Cellular Automata **Cambridge, MA**
Data Visualization & Modeling [Martin Nowak] April 2022

- Extended discrete-space, discrete-state automata (such as Conway's game) into continuous settings
- Characterized stable emergent patterns of randomly initialized automata given the design of kernel convolution approaches to system evolution

Talks

- NIH P20 Proposal Group (Sep 2023)
- Salata Institute South Asia Climate Cluster (Sep 2023)
- Mittal Institute Fall Student Launch Climate Event (Sep 2023)
- West Africa & South Asia Salata Institute Climate Workshop (Nov 2023) [Featured on PBS NewsHour]

Awards

- John Harvard Scholar (2021, 2022)
- Detur Book Prize (2022)
- MCZ Grant for Undergraduate Research ($6000)
- Mittal Institute Grant for Summer Research ($7878)

Skills & Interests

Coding Languages: Python (Advanced), JavaScript (Advanced), C/C++ (Intermediate), R (Beginner)

Domain-Specific Skills: Spatial data analysis (QGIS/ArcGIS, GeoPandas), MLOps (Docker, cloud computing, Kubernetes, Weights & Biases, PyTorch, Keras), computer vision, numerical methods, data visualization (p5.js, d3.js, matplotlib, seaborn, et al.), design (Adobe Creative Cloud Suite)

Interests: Electronic music composition, art history, landscape photography