Michael C. Burkhart

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Interests

applied AI/ML • sequential inference • causality • feature engineering • semi-supervised learning

Education

Brown University
Providence, RI
Ph.D. Applied Mathematics — 2013–2019

Rutgers University
New Brunswick, NJ
M.Sc. Mathematics — 2011–2013

Purdue University
West Lafayette, IN
B.Sc.'s Mathematics, Statistics, & Economics — 2007–2011

Experience

University of Cambridge
Cambridge, UK
Research Associate (Visiting Researcher in 2024) — 2021–2024

- developed trajectory models for the early diagnosis of neurodegenerative disease
- trained graph neural networks to predict brain age (PyTorch geometric)
- worked with research engineers at the Alan Turing Institute to automate the detection of covariate shift

Adobe, Inc.
San Jose, CA
Machine Learning Scientist — 2018–2021

- designed and tested personalized pricing interventions within the cancellation flow (causal forests)
- built and validated predictive models to personalize user experience (PySpark/LightGBM/Airflow)
- supervised intern projects in representation learning for causal inference and semi-supervised learning (Keras/Tensorflow)

BrainGate Clinical Trial
Providence, RI
Graduate Research Assistant — 2014–2018

- developed and implemented a novel nonlinear filter for online neural decoding (Matlab/Python)
- this framework enabled participants with quadriplegia to communicate and interact with their environments in real time using mental imagery alone

Summer research internships at **Spotify, U.S.A.** (Data Research Intern in New York, NY, 2017) & **Argonne National Laboratory** (Graduate Research Aide in Lemont, IL, 2012)

Selected Publications

M. Burkhart & G. Ruiz. Neuroevolutionary representations for learning heterogeneous treatment effects. Journal of Computational Science 71 (2023)

M. Burkhart. Discriminative Bayesian filtering lends momentum to the stochastic Newton method for minimizing log-convex functions. Optimization Letters 17 (2023)

M. Burkhart. Discriminative Bayesian filtering for the semi-supervised augmentation of sequential observation data. Computational Science – ICCS 2021

M. Burkhart & K. Shan. Deep low-density separation for semi-supervised classification. Computational Science – ICCS 2020

M. Burkhart, D. Brandman, B. Franco, L. Hochberg, & M. Harrison. The discriminative Kalman filter for Bayesian filtering with nonlinear and nongaussian observation models. Neural Computation 32 (2020)

D. Brandman, M. Burkhart, J. Kelemen, B. Franco, M. Harrison, & L. Hochberg. Robust closed-loop control of a cursor in a person with tetraplegia using Gaussian process regression. Neural Computation 30 (2018)

Patents & Pending

M. Burkhart & G. Ruiz. Causal inference via neuroevolutionary selection. Filed 2022. Published as US 2023/0376776 A1

M. Burkhart & K. Shan. User classification from data via deep segmentation for semi-supervised learning. Filed 2019. Granted 2022 as US 11,455,518 B2

M. Burkhart & K. Modarresi. Digital experience enhancement using an ensemble deep learning model. Filed 2019. Granted 2023 as US 11,816,562 B2

Community Involvement

Cambridge Psych. Dept.
Cambridge, UK
Research Staff Representative 2022–2023

ICCS Conference
Program Committee Member 2019–2021
- thematic track on Applications of Computational Methods in Artificial Intelligence and Machine Learning

Brown SIAM Student Chapter
Providence, RI
Vice President, Chapter Records 2015–2017
Interdepartmental Liaison Officer
- organized events within the applied math community

Rutgers Math Dept.
New Brunswick, NJ
Graduate Liaison Committee Member 2012–2013

Purdue Student Publishing Foundation
West Layfayette, IN
Member, Corporate Board of Directors 2009–2011
Chairperson, Finance Committee
- oversaw the *Exponent*, Purdue's Independent Daily (at the time) Student Newspaper

Online

homepage • LinkedIn • Google Scholar • Github • orcID