

Charles Delahunt CV

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<https://charlesdelahunt.github.io>

Employment

Global Health Labs, Bellevue, WA (2012 – present)

- Senior Research Engineer, machine learning for medical diagnostics
- Role: Research and develop ML algorithms for impact, tailored to global health use cases
- Projects: automated malaria detection; grain moisture prediction; pregnancy risk stratification; vitamin A deficiency detection from pupillary response; lung ultrasound; Neglected Tropical Disease diagnosis; developing methods for tailoring ML to medical use cases.

U. Washington Applied Math Postdoc (2018 – 2021, J. Nathan Kutz P.I.)

- Data-driven discovery of governing equations in high-noise regimes
- Application of biological learning mechanisms to ML architectures

Key skills

- Tailor machine learning to concrete use cases
- Analyze, interrogate, and understand data sets
- Research and develop end-to-end ML systems
- Honor use-case demands, biophysical priors, and domain knowledge in algorithm design
- Assess algorithm performance and results
- Work with field experts and collaborators
- Take initiative
- Apply image and signal processing
- Manage data and databases
- Write and present – story telling

Education

- Ph.D. Electrical Engineering, University of Washington. Advisors J. Nathan Kutz (Applied Math) and Eve Riskin (Electrical Engineering). 2018
- B.S. Math and Music, MIT

Languages

Python, Matlab, SQL. Some Java, C, Linux, Powershell, Git, Tensorflow.

Conference events

- ML4H 2023: *Invited speaker on ML for global health.*
- MICCAI 2022, 2023: *Half day tutorials on ML for global health.*
- IEEE GHTC 2020, 2022: *Half day tutorials on ML for social good.*

Selected ML for global health papers

(*) indicates lead author

- (*) *Driving down Poisson error can offset classification error in clinical tasks.* arXiv, 2024. [link](#)
- (*) *Metrics to guide development of machine learning algorithms for malaria diagnosis* Frontiers Malaria 2024. [link](#)
- (*) *Algorithms to predict moisture content of grain using relative humidity time-series.* IEEE GHTC 2020. [link](#)
- (*) *Fully-automated patient-level malaria assessment on field-prepared thin blood film microscopy images.* IEEE GHTC 2019. [link](#)
- * *Evaluation of an automated microscope using machine learning for the detection of malaria in travelers returned to the UK.* Front Mal, 2023. [link](#)
- * *Performance of a fully-automated system on a WHO malaria microscopy evaluation slide set.* Malaria J 2021. [link](#)
- * *For more papers, please visit <https://charlesdelahunt.github.io>*

In the press:

- Technology Review: *AI offers a better way to diagnose malaria.* [link](#)

Selected ML papers

(*) indicates lead author

- (*) *A toolkit for data-driven discovery of governing equations in high-noise regimes.* IEEE Access 2022. [link](#)
- (*) *Predicting United States Policy Outcomes with Random Forests.* INET 2020. [link](#)
- (*) *Money on the Table: Statistical information ignored by Softmax can improve classifier accuracy.* arXiv 2019. [link](#)
- (*) *Putting a bug in ML: The moth olfactory network learns to read MNIST.* Neural Networks 2019. [link](#)
- (*) *Insect cyborgs: Bio-mimetic feature generators improve machine learning accuracy on limited data.* NeurIPS workshop 2019. [link](#)
- * *For more papers, please visit <https://charlesdelahunt.github.io>*

In the press:

- Quanta Magazine: *New AI strategy mimics how brains learn to smell.* [link](#)
- Technology Review: *Why even a moth's brain is smarter than AI.* [link](#)
- The Register: *Moth brain AI.* [link](#)

Patents

- Image analysis systems and related methods. Patent # 10061972
- Devices and methods for staining and microscopy. Patent # 9453996

Service

- Board member, RISE-MICCAI (Reinforcing inclusiveness & diversity and empowering MICCAI in low-to-middle income countries) [link](#)
- Scientific committee member (schistosomiasis subcommittee), ASTMH [link](#)
- Advisor, WHO document on digital microscopy for malaria, 2023
- Peer Reviewer: NeurIPS, ICML, MICCAI, PREPSS, ML4H, CHIL, TMLR, Mal J, etc.
- Roosevelt High School Vocational Advisory Committee (for technical education)
- Devoted runner 😊