Vu Dinh

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RESEARCH INTERESTS

Mathematical and computational biology: mathematical phylogenetics; statistical methods in evolutionary biology; uncertainty quantification, experimental design and control of biological systems

Machine learning: statistical learning with structured data; Bayesian methods; explainable machine learning

ACADEMIC APPOINTMENTS

Program Director   January 2025 – present
Mathematical Biology Program
Division of Mathematical Sciences
National Science Foundation.

Associate Professor   September 2023 – present
Department of Mathematical Sciences
University of Delaware, Newark, Delaware.

Research Fellow   September 2024 – December 2024
Institute for Computational and Experimental Research in Mathematics (ICERM)
Brown University, Providence, Rhode Island.

Assistant Professor   August 2017 – August 2023
Department of Mathematical Sciences
University of Delaware, Newark, Delaware.

Postdoctoral Research Fellow   January 2015 – July 2017
Program in Computational Biology
Fred Hutchinson Cancer Research Center, Seattle, Washington.

EDUCATION

2014 **Purdue University**, West Lafayette, Indiana, US
Ph.D. in Mathematics

2009 **Université d'Orléans**, Orléans, France
M.S. in Applied Mathematics, 2009

2008 **University of Science**, Ho Chi Minh City, Vietnam
B.S. in Mathematics and Computer Science

PUBLICATIONS

1. Vu Dinh, Lam Si Tung Ho and Cuong Nguyen.
Hamiltonian Monte Carlo on ReLU neural networks is inefficient.
Advances in Neural Information Processing Systems (NeurIPS 2024).

2. Vu, Nhat L., Thanh P. Nguyen, Binh T. Nguyen, Vu Dinh, and Lam Si Tung Ho.
   When can we reconstruct the ancestral state? Beyond Brownian motion.
   Journal of Mathematical Biology 86, no. 6 (2023): 88.

3. Nguyen, Cuong N., Phong Tran, Lam Si Tung Ho, Vu Dinh, Anh T. Tran, Tal Hassner, and Cuong V. Nguyen.
   Simple transferability estimation for regression tasks.
   Uncertainty in Artificial Intelligence (UAI 2023).

4. Lam Si Tung Ho* and Vu Dinh*.
   When can we reconstruct the ancestral state? A unified theory.
   Theoretical Population Biology 148 (2022): (22–27).

5. Allison E. Miller*, Emily Russell*, Darcy Reisman, Hyosub Kim* and Vu Dinh* (2022).
   A machine learning approach to identifying important features for achieving step thresholds in individuals with chronic stroke.
   PLOS One 17.6 (2022): e0270105.

6. Lam Si Tung Ho* and Vu Dinh*.
   Searching for minimal optimal neural networks.
   Statistics and Probability Letters (2022): 109353.

7. Cuong N. Nguyen, Lam Si Tung Ho, Vu Dinh, Tal Hassner, Cuong V Nguyen (2022).
   Generalization bounds for deep transfer learning using majority predictor accuracy.
   International Symposium on Information Theory and Its Applications (ISITA 2022).

8. Cuong V Nguyen, Lam Si Tung Ho, Huan Xu, Vu Dinh, Binh T Nguyen.
   Bayesian active learning with abstention feedbacks.
   Neurocomputing 471 (2022): 242-250.

9. Vu Dinh* and Lam Si Tung Ho* (2021).
   Convergence of maximum likelihood supertree reconstruction.
   AIMS Mathematics 6 (8), 8870-8883.

10. Cheng Zhang*, Vu Dinh* and Frederick A. Matsen IV.
    Non-bifurcating phylogenetic inference via the adaptive lasso.
    The Journal of the American Statistical Association 116.534 (2021): 858-873.

11. Vu Dinh* and Lam Si Tung Ho*.
    Consistent feature selection for analytic deep neural networks.
    Advances in Neural Information Processing Systems (NeurIPS 2020)

12. Lam Si Tung Ho, Binh T Nguyen, Vu Dinh, Duy Nguyen.
    Posterior concentration and fast convergence rates for generalized Bayesian learning.
    Information Sciences 538 (2020): 372-383.

13. Lam Si Tung Ho*, Vu Dinh*, Frederick A. Matsen IV and Marc A. Suchard.
    Consistency of the maximum likelihood estimator for the transition rate under a 2-state symmetric model.
    The Journal of Mathematical Biology 80.4 (2020): 1119-1138.

14. Lam Si Tung Ho, Vu Dinh and Cuong Nguyen.
    Multi-task learning improves ancestral state reconstruction in evolutionary biology.
    Theoretical Population Biology 126 (2019): 33-39.

15. David A. Shaw, Vu Dinh and Frederick A. Matsen IV.
    Joint maximum likelihood of phylogeny and ancestral states is not consistent.
    Molecular Biology and Evolution 36.10 (2019): 2352-2357.

16. Binh T. Nguyen, Duy M. Nguyen, Lam S. T. Ho and Vu Dinh.
    An active learning framework for set inversion.
    Knowledge-Based Systems 185 (2019): 104917.

17. Vu Dinh*, Lam Si Tung Ho*, Marc A. Suchard and Frederick A. Matsen IV.
    Consistency and convergence of phylogenetic inference with species tree regularization.
    The Annals of Statistics 46.4 (2018): 1481-1512.

18. Vu Dinh, Aaron E. Darling and Frederick A. Matsen IV.
    Online Bayesian phylogenetic inference: theoretical foundations via Sequential Monte Carlo.
    Systematic Biology 67.3 (2018) 503–517.

19. Mathieu Fourment, Brian C. Claywell, Vu Dinh, Connor McCoy, Frederick A. Matsen IV and Aaron E. Darling.
    Effective online Bayesian phylogenetics via Sequential Monte Carlo with guided proposals.
    Systematic Biology 67.3 (2018) 490–502.

20. Owen G. Rehrauer, Vu Dinh, Bharat R. Mankani, Gregery T. Buzzard, Bradley Lucier and Dor Ben-Amotz.
    Binary-complementary compressive filters for Raman spectroscopy.
    The Journal of Applied Spectroscopy 72.1 (2018), 69-78.

21. Brian C. Claywell, Vu Dinh, Mathieu Fourment, Conner O. McCoy and Frederick A. Matsen IV.
    A surrogate function for one-dimensional phylogenetic likelihoods.
    Molecular Biology and Evolution 35.1 (2018), 242-246.

22. Binh T. Nguyen, Duy M. Nguyen, Lam S. T. Ho and Vu Dinh.
    OASIS: An active learning framework for set inversion.
    International Conference on Intelligent Software Methodologies, Tools and Techniques (SoMeT 2018).
    This paper wins the Best Paper Award of the conference.

23. Vu Dinh and Frederick A. Matsen IV.
    The shape of the one-dimensional phylogenetic likelihood function.
    The Annals of Applied Probability 27.3 (2017): 1646-1677.

24. Vu Dinh, Ann E. Rundell and Gregery T. Buzzard.
    Convergence of Griddy Gibbs sampling and other perturbed Markov chains.
    Journal of Statistical Computation and Simulation 87.7 (2017): 1379-1400.

25. Ankush Chakrabarty, Vu Dinh, Martin Corless, Ann E. Rundell, Stanislaw H. Zak and Gregery T. Buzzard.
    SVM-informed explicit nonlinear model predictive control using low-discrepancy sequences.
    IEEE Transactions on Automatic Control 62.1 (2017): 135-148.

26. Vu Dinh*, Arman Bilge*, Cheng Zhang* and Frederick A. Matsen IV.
    Probabilistic path Hamiltonian Monte Carlo.
    International Conference on Machine Learning (ICML 2017).

27. Vu Dinh, Lam Si Tung Ho, Binh T. Nguyen and Duy Nguyen.
    Fast learning rates with heavy-tailed losses.
    Advances in Neural Information Processing Systems (NIPS 2016).

28. Vu Dinh*, Lam Si Tung Ho*, Nguyen Viet Cuong, Duy Nguyen and Binh T. Nguyen.
    Learning from non-iid data: fast rates for the one-vs-all multiclass plug-in classifiers.
    Theory and Applications of Models of Computation (TAMC 2015).

29. Vu Dinh, Ann E. Rundell and Gregery T. Buzzard.
    Experimental design for dynamic identification of cellular processes.
    Bulletin of Mathematical Biology 76.3 (2014): 597-626.

30. Vu Dinh, Ann E. Rundell and Gregery T. Buzzard.
    Effective sampling schemes for behavior discrimination for nonlinear models.
    International Journal for Uncertainty Quantification 4.6 (2014): 535-554.

31. Ankush Chakrabarty, Vu Dinh, Gregery T. Buzzard, Stanislaw H. Zak and Ann E. Rundell.
    Robust explicit nonlinear model predictive control with integral sliding mode.
    American Control Conference (ACC 2014).

32. Nguyen Viet Cuong, Lam Si Tung Ho and Vu Dinh.
    Generalization and robustness of batched weighted average algorithm with V-geometrically ergodic Markov data.
    Algorithmic Learning Theory (ALT 2013).

33. Jeffrey P. Perley, Judith Mikolajczak, Vu Dinh, Marietta L. Harrison, Gregery T. Buzzard and Ann E. Rundell.
    Systematically manipulating T-cell signaling dynamics via multiple model informed open-loop controller design.
    IEEE Conference on Decision and Control (CDC 2012).

34. Nguyen Viet Cuong, Vu Dinh and Lam Si Tung Ho.
    Mel-frequency cepstral coefficients for eye movement identification.
    IEEE International Conference on Tools with Artificial Intelligence (ICTAI 2012).

35. Duong Minh Duc*, Ho Si Tung Lam*, Nguyen Quang Thang* and Dinh Cao Duy Thien Vu* (2011).
    On Harnack's inequality for non-uniformly p-Laplacian equations
    Acta Mathematica Vietnamica 36 (2): 199-214.

PREPRINTS

1. Emily Russel, Lam Si Tung Ho, Cuong Nguyen and Vu Dinh (2024).
Theoretical properties of explainable AI for weakly-supervised object localization.
In submission.

GRANTS

NSF Award DMS-1951474 (07/31/2020 – 08/01/2024). *A statistical learning framework for phylogenetic inference: information, uncertainty, and geometry.* PI: Vu Dinh

UDRF Strategic Initiatives Grant (02/01/2022 – 01/31/2025). *Information-theoretical and geometric measures of phylogenetic diversity*. PIs: Vu Dinh and Mokshay Madiman

PROFESSIONAL SERVICES

- NSF Reviewer: 2019, 2020, 2021, 2022, 2023, 2024

- Reviewer (Mathematical and computational biology):
  - Journal of Mathematical Biology
  - Bulletin of Mathematical Biology
  - Bioinformatics
  - Systematic Biology
  - IEEE/ACM Transactions on Computational Biology and Bioinformatics
  - BMC Genomics
  - IET Systems Biology
  - American Control Conference (ACC)

- Reviewer (Statistics and machine learning):
  - Journal of the American Statistical Association (Theory and Methods)
  - Journal of Machine Learning Research
  - Transactions on Machine Learning Research
  - Journal of Computational and Graphical Statistics
  - Bayesian Analysis
  - Conference on Neural Information Processing Systems (NeurIPS)
  - International Conference on Machine Learning (ICML)
  - International Conference on Learning Representations (ICLR)
    I am recognized as a "Highlighted Reviewer of ICLR 2022" (Top 10% reviewers of the conference).
  - AAAI Conference on Artificial Intelligence (AAAI)
  - International Conference on Artificial Intelligence and Statistics (AISTATS)
  - European Conference on Computer Vision (ECCV)
  - Conference on Computer Vision and Pattern Recognition (CVPR)