

CONTACT INFORMATION

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EDUCATION

The University of Texas at Austin, Texas, USA. 2022-2027
 Ph.D Student in Statistics at the Department of Statistics and Data Sciences.

- Advisors: Professor [Nhat Ho](#) and Professor [Alessandro Rinaldo](#).
- GPA: 4.0/4.0

Ho Chi Minh University of Science, Ho Chi Minh City, Vietnam. 2017-2020
 Bachelor of Science in Mathematics and Computer Science, Honor Program.

- Supervisor: Professor [Dang Duc Trong](#).
- GPA: 9.75/10.0 - *Summa Cum Laude*.

RESEARCH EXPERIENCE

Microsoft AI, Redmond, WA, USA. Summer 2024
 Research Intern.

- Research topics: Applications of Mixture of Experts in Large Language Models.
- Propose a method for selecting crucial attention heads in the multi-head mechanism based on the routing strategy in mixture of experts to improve the efficiency of the Large Language Models.

The University of Texas at Austin, Texas, USA. 2023-Present
 Graduate Research Assistant.

- Research topics: Towards Understanding Mixture of Experts: From Theory to Practice.
- Advisor: Professor [Nhat Ho](#) and Professor [Alessandro Rinaldo](#).

VinAI Research, Hanoi, Vietnam. 2020-2022
 AI Research Resident.

- Research topics: Optimal Transport theory and its applications in Domain Adaptation.
- Skill gained: Did research on Optimal Transport (Sinkhorn algorithms, Barycenter computation, etc) and applied them to study Data Shift and Label Shift problems in Domain Adaptation.

RESEARCH INTERESTS

My current research focuses on theoretical foundations for Mixture-of-Experts (MoE) models. In particular, I study the effects of different gating functions (softmax gate, top-K sparse gate, dense-to-sparse gate, sigmoid gate, etc) on the convergence behavior of expert estimation under the MoE models. Based on insights from these results, I aim to design novel gating functions and characterize expert networks which help improve the performance of MoE applications, including Large Language Models, Multimodal Learning and Parameter-efficient Fine-tuning (including prompt-based tuning and adapter-based tuning). Additionally, I am also interested in Optimal Transport theory.

PUBLICATIONS

17. **Huy Nguyen**, Nhat Ho**, Alessandro Rinaldo**. [Sigmoid Gating is More Sample Efficient than Softmax Gating in Mixture of Experts](#) . *Advances in Neural Information Processing Systems*, 2024.
16. Xing Han, **Huy Nguyen***, Carl Harris*, Nhat Ho, Suchi Saria. [FuseMoE: Mixture-of-Experts Transformers for Fleximodal Fusion](#) . *Advances in Neural Information Processing Systems*, 2024.
15. Minh Le, An Nguyen*, **Huy Nguyen***, Trang Nguyen*, Trang Pham*, Linh Van Ngo, Nhat Ho. [Mixture of Experts Meets Prompt-Based Continual Learning](#) . *Advances in Neural Information Processing Systems*, 2024.

14. **Huy Nguyen**, Nhat Ho**, Alessandro Rinaldo**. [On Least Square Estimation in Softmax Gating Mixture of Experts](#). *Proceedings of the International Conference on Machine Learning*, 2024.
13. **Huy Nguyen**, Pedram Akbarian, Nhat Ho. [Is Temperature Sample Efficient for Softmax Gaussian Mixture of Experts?](#) *Proceedings of the International Conference on Machine Learning*, 2024.
12. **Huy Nguyen**, Pedram Akbarian, TrungTin Nguyen, Nhat Ho. [A General Theory for Softmax Gating Multinomial Logistic Mixture of Experts](#). *Proceedings of the International Conference on Machine Learning*, 2024.
11. **Huy Nguyen**, Pedram Akbarian, Fanqi Yan, Nhat Ho. [Statistical Perspective of Top-K Sparse Softmax Gating Mixture of Experts](#). *In International Conference on Learning Representations*, 2024.
10. **Huy Nguyen***, TrungTin Nguyen*, Khai Nguyen, Nhat Ho. [Towards Convergence Rates for Parameter Estimation in Gaussian-gated Mixture of Experts](#). *In International Conference on Artificial Intelligence and Statistics*, 2024.
9. **Huy Nguyen**, Khai Nguyen, Nhat Ho. [On Parameter Estimation in Gaussian Deviated Mixture of Experts](#). *In International Conference on Artificial Intelligence and Statistics*, 2024.
8. **Huy Nguyen**, TrungTin Nguyen, Nhat Ho. [Demystifying Softmax Gating Function in Gaussian Mixture of Experts](#). *Advances in Neural Information Processing Systems*, 2023 (*Spotlight*, Top 3.6% out of 12343 submissions).
7. Dat Do*, **Huy Nguyen***, Khai Nguyen, Nhat Ho. [Minimax Optimal Rate for Parameter Estimation in Multivariate Deviated Models](#). *Advances in Neural Information Processing Systems*, 2023.
6. Dung Le*, **Huy Nguyen***, Khai Nguyen*, Trang Nguyen*, Nhat Ho. [Fast Approximation of the Generalized Sliced-Wasserstein Distance](#). *IEEE International Conference on Acoustics, Speech and Signal Processing*, 2024.
5. Khai Nguyen, Tongzheng Ren, **Huy Nguyen**, Litu Rout, Tan Nguyen, Nhat Ho. [Hierarchical Sliced Wasserstein Distance](#). *In International Conference on Learning Representations*, 2023.
4. **Huy Nguyen***, Khang Le*, Dung Le*, Dat Do, Tung Pham, Nhat Ho. [Entropic Gromov-Wasserstein between Gaussian Distributions](#). *Proceedings of the International Conference on Machine Learning*, 2022.
3. **Huy Nguyen***, Khang Le*, Khai Nguyen, Tung Pham, Nhat Ho. [On Multimarginal Partial Optimal Transport: Equivalent Forms and Computational Complexity](#). *In International Conference on Artificial Intelligence and Statistics*, 2022.
2. **Huy Nguyen***, Khang Le*, Quang Minh Nguyen, Tung Pham, Hung Bui, Nhat Ho. [On Robust Optimal Transport: Computational Complexity and Barycenter Computation](#). *Advances in Neural Information Processing Systems*, 2021.
1. Thu Nguyen, Duy H. M. Nguyen, **Huy Nguyen**, Binh T. Nguyen, Bruce A. Wade. [EPEM: Efficient Parameter Estimation for Multiple Class Monotone Missing Data](#). *Information Sciences Journal*, Volume 567, page 1-22.

PREPRINTS

6. **Huy Nguyen***, Xing Han*, Carl Harris, Suchi Saria**, Nhat Ho**. [On Expert Estimation in Hierarchical Mixture of Experts: Beyond Softmax Gating Functions](#). *Under review*, *arXiv:2410.02935*.
5. Minh Le*, Chau Nguyen*, **Huy Nguyen***, Quyen Tran, Trung Le, Nhat Ho. [Revisiting Prefix-tuning: Statistical Benefits of Reparameterization among Prompts](#). *Under review*, *arXiv:2410.02200*.
4. **Huy Nguyen**, Pedram Akbarian*, Trang Pham*, Trang Nguyen*, Shujian Zhang, Nhat Ho. [Statistical Advantages of Perturbing Cosine Router in Mixture of Experts](#). *Under review*, *arXiv:2405.14131*.
3. Pedram Akbarian*, **Huy Nguyen***, Xing Han*, Nhat Ho. [Quadratic Gating Functions in Mixture of Experts: A Statistical Insight](#). *Under review*.

2. Fanqi Yan*, **Huy Nguyen***, Dung Le*, Pedram Akbarian, Nhat Ho. [Understanding Expert Structures on Minimax Parameter Estimation in Contaminated Mixture of Experts](#) . *Under review*.
1. Quang Pham, Giang Do, **Huy Nguyen**, TrungTin Nguyen, Chenghao Liu, Mina Sartipi, Binh T. Nguyen, Savitha Ramasamy, Xiaoli Li, Steven Hoi, Nhat Ho. [CompeteSMoE - Effective Training of Sparse Mixture of Experts via Competition](#) . *Under review, arXiv:2402.02526*.

TEACHING EXPERIENCE

The University of Texas at Austin, Texas, USA.

Teaching Assistant at the Department of Statistics and Data Sciences.

- SDS302F - Foundations of Data Analysis. Fall 2022
- SDS322E - Elements of Data Science. Spring 2023
- SDS320E - Elements of Statistics. Fall 2023

PROFESSIONAL SERVICES

- Reviewer at the Electronic Journal of Statistics ([EJS](#)).
- Reviewer at the International Conference on Machine Learning ([ICML](#)) 2022, 2024.
- Reviewer at the Conference on Neural Information Processing Systems ([NeurIPS](#)) 2022-2024.
- Reviewer at the International Conference on Artificial Intelligence and Statistics ([AISTATS](#)) 2022-2025.
- Reviewer at the International Conference on Learning Representations ([ICLR](#)) 2024-2025.
- Reviewer at the Association for the Advancement of Artificial Intelligence ([AAAI](#)) 2025.
- Reviewer at the New Frontiers in Learning, Control, and Dynamical Systems Workshop ([ICML](#)) 2023.

HONORS AND AWARDS

- **AISTATS 2024 Registration Grant.** 2024
- **ICLR 2024 Travel Award.** 2024
- **NeurIPS 2023 Scholar Award.** 2023
- **Doctoral Fellowship** of the University of Texas at Austin. 2022
- Class of 2020 **Valedictorian** of Ho Chi Minh University of Science (HCMUS). 2020
 - Graduated 1 year earlier with the highest GPA ever in HCMUS, at 9.75/10.0.
- **Merit Scholarship** for gifted students in Mathematics. 2018, 2019
 - Granted by [Vietnam Institute for Advanced Study in Mathematics \(VIASM\)](#).
- **Full Scholarship** of Ho Chi Minh University of Science. 2017
 - Only for a student having the highest score in the university entrance examination.

TECHNICAL SKILLS

- *System*: MacOS, Linux, Windows.
- *Programming Languages*: Python (Pytorch, Sci-kit Learn, Numpy, Matplotlib), R, MATLAB.
- *Softwares*: LaTeX, Microsoft Offices.

REFERENCES

- **Nhat Ho**. Email: minhnhath@utexas.edu (Advisor).
- **Alessandro Rinaldo**. Email: alessandro.rinaldo@austin.utexas.edu (Advisor).