

## CONTACT INFORMATION

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## EDUCATION

**The University of Texas at Austin**, Austin, TX, USA. 2022-2027  
 Ph.D Candidate 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.

- Advisor: 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**, Austin, TX, USA. 2024-Present  
 Graduate Research Assistant.

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

**VinAI**, 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 research focuses on theoretical foundations for the Mixture-of-Experts (MoE) models where I study the effects of different gating functions (namely the softmax gate, the top-K sparse gate, the dense-to-sparse gate and the sigmoid gate, etc) on the convergence behavior of expert estimation. Based on insights from these results, I aim to design novel gating functions and characterize expert networks which help improve the efficiency and scalability of the 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*, *arXiv:2410.11222*.

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, arXiv:2410.12258*.
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**, Austin, TX, 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

**Program Committee/Reviewer** at

- the Electronic Journal of Statistics ([EJS](#)).
- the International Conference on Machine Learning ([ICML](#)) 2022-2025.
- the Conference on Neural Information Processing Systems ([NeurIPS](#)) 2022-2024.
- the International Conference on Artificial Intelligence and Statistics ([AISTATS](#)) 2022-2025.
- the International Conference on Learning Representations ([ICLR](#)) 2024-2025.
- the Association for the Advancement of Artificial Intelligence ([AAAI](#)) 2025.

HONORS AND  
AWARDS

- Top Reviewer at NeurIPS 2024. 2024
- 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).