Huyen-Trang Pham

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Education

The University of Texas at Austin Texas, USA
PhD in Statistics 2025 – Present
GPA: 4.0/4.0

Hanoi University of Science and Technology (HUST) Hanoi, Vietnam
Bachelor of Data Science and Artificial Intelligence 2020 – 2024
CPA: 3.81/4.0 (Excellent degree)

Skills Summary

- **Programming:**: Python, Java, C++, SQL
- **Machine Learning:**: PyTorch, TensorFlow, scikit-learn
- **Methods:**: Deep Learning, NLP, Statistical Learning, Optimization

Relevant Course

- **Relevant Graduate Coursework**: Advanced Statistical Modeling and Applications; Theory of the Linear Model; Computational Inference; Concepts in Mathematical Statistics; Theoretical Statistics and Machine Learning

Research Experience

- **Graduate Researcher - The University of Texas at Austin (August 2025 - Present)**:
  Advisors: Prof. Nhat Ho, Prof. Pratik Patil
  Research directions: Statistical Machine Learning and Model Adaptation

  Learning and Inference in Latent Variable Models
  - Developed theoretical guarantees for latent recovery in hidden Markov models, revealing how model complexity and latent structure affect estimation accuracy.
  - Co-developed a partial optimal transport framework for finite mixture models, establishing convergence guarantees and characterizing heterogeneous learning behavior.
  - Analyzed the asymptotic behavior of mixture models, providing insights into parameter recovery and estimation reliability.

  Learning Efficiency in Mixture-of-Experts Models
  - Established optimal estimation rates for contaminated mixtures of multinomial logistic experts, demonstrating how expert heterogeneity improves sample efficiency.

  Test-Time Training and Model Adaptation
  - Investigating when test-time training improves model performance under distribution shifts, examining the conditions that make adaptation to new data effective.

- **AI Research Resident - Qualcomm AI Research (April 2025 - August 2025)**:
  Mentors: Prof. Tan Nguyen, Dr. Toan Tran
  Research directions: Mixture of Experts, State-Space Models, Model Quantization

  Quantization for State-Space Models
  - Applied and adapted existing quantization methods to modern State-Space Models, targeting reduced-precision inference.
  - Benchmarked quantized SSMs across precision settings and model architectures, evaluating accuracy–efficiency trade-offs and the applicability of existing quantization techniques.

- **AI Research Resident - VinAI Research (August 2023 - March 2025)**:
  Mentors: Prof. Nhat Ho, Prof. Tan Nguyen
  Research directions: Mixture of Experts, Continual Learning, Optimal Transport

  Mixture of Experts and Continual Learning
  - Established a connection between self-attention, prefix tuning, and **Mixture-of-Experts** models by interpreting prefix prompts as task-specific experts, motivating a new perspective on prompt-based continual learning.
  - Co-developed **Non-linear Residual Gates (NoRGa)**, a parameter-efficient gating mechanism combining nonlinear activation and residual connections, and validated its effectiveness theoretically and empirically across continual-learning benchmarks and pretraining paradigms.
  - Analyzed the statistical limitations of the **cosine router** in sparse MoE models, showing that interactions among model parameters can lead to non-polynomial estimation rates; studied a perturbed cosine router that restores polynomial rates and validated the theoretical findings through synthetic and real-data experiments.

  Optimal Transport
  - Co-developed Tree-Sliced Wasserstein (TSW) distances that replace one-dimensional projections with tree-structured metric spaces, outperforming Sliced-Wasserstein variants across gradient flows, image style transfer, and generative modeling while retaining efficient computation.
  - Developed generalized splitting mechanisms for Distance-based Tree-Sliced Wasserstein (Db-TSW), incorporating positional information from measure supports and projection domains; improved generative performance over recent SW/TSW baselines at comparable computational cost.

- Extended Tree-Sliced Wasserstein through nonlinear projections and spherical tree structures, preserving theoretical guarantees while achieving consistent gains over recent SW/TSW variants across gradient flows, self-supervised learning, and generative modeling.

- **Research Student, DSLab - SoICT - HUST (December 2021 - August 2024)**:
  Advisors: Prof. Khoat Than, Dr. Linh Ngo
  Research directions: Online Learning, Continual Learning
  - Investigated Bayesian online-learning approaches for **concept drift**, and developed adaptive-dropout and hypernetwork architectures for efficient online learning.
  - Studied major approaches to **continual learning** and proposed Lipschitz-driven regularization for memory-based continual learning based on theoretical insights into local robustness.

Teaching Experience & Professional Services

- **Reviewer**: ICLR 2025-2027, AISTATS 2025-2026, ICML 2025, NeurIPS 2026, TMLR 2026
- **Undergraduate Teaching Assistant**: Introduction to Data Science, Object-Oriented Programming
- **Graduate Teaching Assistant**: Elements of Statistics, Introduction to Probability and Statistics, Elements of Data Science

Publications

- **Trang Pham***, Viet-Hoang Tran*, Tho Tran, Minh Khoi Nguyen Nhat, Thanh Chu, Tam Le**, Tan M. Nguyen**. *Tree-Sliced Wasserstein Distance: A Geometric Perspective.* ICML, 2025 [PDF].
- Thanh Tran*, Viet-Hoang Tran*, Thanh Chu, **Trang Pham**, Laurent Ghaoui**, Tam Le**, Tan M. Nguyen**. *Tree-Sliced Wasserstein Distance with Nonlinear Projection.* ICML, 2025 [PDF].
- Huy Nguyen, Pedram Akbarian*, **Trang Pham***, Trang Nguyen*, Shujian Zhang, Nhat Ho. *Statistical Advantages of Perturbing Cosine Router in Sparse Mixture of Experts.* ICLR, 2025 [PDF].
- Viet-Hoang Tran*, Minh Khoi Nguyen Nhat*, **Trang Pham**, Thanh Chu, Tam Le**, Tan M. Nguyen**. *Distance-based Tree-Sliced Wasserstein distance.* ICLR, 2025 [PDF].
- Viet-Hoang Tran*, Thanh Chu*, Minh Khoi Nguyen Nhat, **Trang Pham**, Tam Le**, Tan M. Nguyen**. *Spherical Tree-Sliced Wasserstein distance.* ICLR, 2025 [PDF].
- Minh Le, An Nguyen*, Huy Nguyen*, Trang Nguyen*, **Trang Pham***, Linh Van Ngo, Nhat Ho. *Mixture of Experts Meets Prompt-Based Continual Learning.* NeurIPS, 2024 [PDF].

Preprints

- **Trang Pham***, Dung Le*, Alessandro Rinaldo, Nhat Ho. *The Statistical Geometry of Latent Recovery in Hidden Markov Models.* Under review, 2026 [PDF].
- Dung Le, **Trang Pham**, Alessandro Rinaldo, Nhat Ho. *Weak Limits of Parameter Estimation in Strongly Identifiable Mixture Models.* Under review, 2026 [PDF].
- Dung Le*, Huy Nguyen*, **Trang Pham**, Alessandro Rinaldo, Nhat Ho. *Characterizing Heterogeneous Rates in Finite Mixture Estimation via Partial Optimal Transport.* Under review, 2026 [PDF].
- Fanqi Yan*, Dung Le*, **Trang Pham**, Huy Nguyen, Nhat Ho. *Improving Minimax Estimation Rates for Contaminated Mixture of Multinomial Logistic Experts via Expert Heterogeneity.* Under review, 2026 [PDF].

Scholarship

- **Academic Achievement Scholarship - HUST**
  Awarded to top 3% HUST students having excellent academic achievements (Received in 2021, 2022, and 2024.)
- **Vietcombank scholarship** 2024
  Scholarship of Vietcombank for students with excellent academic performance.
- **Exness scholarship** 2023
  Scholarship of Exness company for students with excellent academic performance and good English.

Honor and Adwards

- **Best Thesis Award** July, 2025
  Awarded for the best graduation thesis among over 1,400 theses in the Class of 2024, SoICT, HUST
- **Best Presentation Award** July, 2024
  Awarded for the student with out-standing thesis presentation, SoICT, HUST

References

- **Prof. Nhat Ho**
  The University of Texas at Austin
- **Prof. Khoat Than**
  Hanoi University of Science and Technology