

TrungTin Nguyen

Curriculum Vitae (Short)

Postdoctoral Research Fellow
The University of Queensland

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📄 **Homepage:** trung-tinnnguyen.github.io
Long CV Version, January 1, 2024



"The book of nature is written in the language of mathematics." (Galileo G., 1890).

"Essentially, all models are wrong, but some are useful." (George E.P. Box, 1979).

Academic Appointment

12/2023–present **Postdoctoral Research Fellow**, *School of Mathematics and Physics, University Of Queensland*, Brisbane, Australia.

Topic: Mathematical analysis of operator learning with artificial neural networks.

Mentors: [Hien Duy Nguyen](#), and [Xin Guo](#).

2022–2023 **Postdoctoral Fellow**, *Statify Team, Inria centre at the University Grenoble Alpes, MIAI Grenoble Alpes*, Grenoble, France.

Topic: Bayesian model selection and simulated-based inference for complex and high-dimensional models.

Mentors: [Florence Forbes](#), and [Julyan Arbel](#).

Tertiary Education

2018–2021 **Doctor of Philosophy**, *Normandie Université*, Caen, France.

Major in Statistics and Data Science. Defended on December 14, 2021.

Thesis title: *Model selection and approximation in high-dimensional mixture of experts models: from theory to practice.*

Advisors: [Faïcel Chamroukhi](#). **Rapporteurs:** [Sylvain Arlot](#), and [Judith Rousseau](#).

Committee members: [Christophe Biernacki](#), [Hien Duy Nguyen](#), and [Gaëlle Chagny](#).

2017–2018 **Master of Science, Technology and Health**, *Université d'Orléans*, Orléans, France, GPA: 18/20. Mention: *Très Bien*. Major in Applied Mathematics.

Thesis title: Reinforcement learning for resource allocation problems using a partially observable Markov decision process.

Advisor: [Le Thi Hoai An](#).

2013–2017 **Bachelor of Science**, *Vietnam National University-Ho Chi Minh University of Science (VNU-HCM)*, Ho Chi Minh City, Vietnam, GPA: 9.17/10. Rank: 2/1557, Summa Cum Laude.

Honors Program in Mathematics and Computer Science. Major in Probability and Statistics.

Thesis title: Multiplicative censoring model.

Advisor: [Dang Duc Trong](#).

Research Interests

Statistical learning [Model selection](#) (minimal penalties and slope heuristics, non-asymptotic oracle inequalities), [simulation-based inference](#) (approximate Bayesian computation, Bayesian synthetic likelihood, method of moments), [Bayesian nonparametrics](#) (Gibbs-type priors, Dirichlet process mixture), [high-dimensional statistics](#) (variable selection via Lasso and penalization, graphical models), [uncertainty estimation](#).

Machine learning [Supervised learning](#) (deep hierarchical mixture of experts, deep neural networks), [unsupervised learning](#) (clustering via mixture models, dimensionality reduction via principal component analysis, deep generative models via variational autoencoders, generative adversarial networks and normalizing flows), [reinforcement learning](#) (partially observable Markov decision process).

- Optimization** [Robust and effective optimization algorithms for mixture models](#) (expectation–maximization, variational Bayesian expectation–maximization, Markov chain Monte Carlo methods), [difference of convex algorithm](#), [optimal transport](#) (Wasserstein distance, voronoi loss function).
- Applications** [Natural language processing](#) (large language model), [remote sensing](#) (planetary science, e.g., retrieval of Mars surface physical properties from hyper-spectral images), [audio processing](#) (sound source localization), [biostatistics](#) (genomics, transcriptomics, proteomics), [computer vision](#) (image segmentation).

Selected Publications

Deep neural networks

- 2023 Truong Giang Do, Huy Khiem Le, Quang Pham, TrungTin Nguyen, Binh T. Nguyen, Thanh-Nam Doan, Chenghao Liu, Savitha Ramasamy, Xiaoli Li, and Steven HOI. [HyperRouter: Towards Efficient Training and Inference of Sparse Mixture of Experts](#). In **Empirical Methods in Natural Language Processing, EMNLP 2023 Main**, Acceptance rate 14% over 1041 submissions, December 2023.

Approximation capabilities and convergence rates of the mixture of experts models

- 2023 Huy Nguyen, TrungTin Nguyen, Khai Nguyen, and Nhat Ho. [Towards Convergence Rates for Parameter Estimation in Gaussian-gated Mixture of Experts](#). *arXiv preprint arXiv:2305.07572*, May 2023.
- 2023 Huy Nguyen, TrungTin Nguyen, and Nhat Ho. [Demystifying Softmax Gating Function in Gaussian Mixture of Experts](#). In **Thirty-seventh Conference on Neural Information Processing Systems, NeurIPS 2023 Spotlight**, Acceptance rate 3.6% over 12343 submissions, December 2023.
- 2023 Huy Nguyen, Pedram Akbarian, TrungTin Nguyen, and Nhat Ho. [A General Theory for Softmax Gating Multinomial Logistic Mixture of Experts](#). *arXiv preprint arXiv:2310.14188*, October 2023.
- 2022 TrungTin Nguyen, Faicel Chamroukhi, Hien D. Nguyen, and Geoffrey J. McLachlan. [Approximation of probability density functions via location-scale finite mixtures in Lebesgue spaces](#). **Communications in Statistics - Theory and Methods**, pages 1–12, May 2022.
- 2021 Hien Duy Nguyen, TrungTin Nguyen, Faicel Chamroukhi, and Geoffrey John McLachlan. [Approximations of conditional probability density functions in Lebesgue spaces via mixture of experts models](#). **Journal of Statistical Distributions and Applications**, volume 8, page 13, 2021.
- 2020 TrungTin Nguyen, Hien D Nguyen, Faicel Chamroukhi, and Geoffrey J McLachlan. [Approximation by finite mixtures of continuous density functions that vanish at infinity](#). **Cogent Mathematics & Statistics**, volume 7, page 1750861. Cogent OA, 2020.

Model selection

- 2023 TrungTin Nguyen, Dung Ngoc Nguyen, Hien Duy Nguyen, and Faicel Chamroukhi. [A non-asymptotic risk bound for model selection in high-dimensional mixture of experts via joint rank and variable selection](#). In **Australasian Joint Conference on Artificial Intelligence 2023, AJCAI 2023 Long Oral Presentation**, Acceptance rate 11% over 213 submissions, November 2023.
- 2023 TrungTin Nguyen, Florence Forbes, Julyan Arbel, and Hien Duy Nguyen. [Bayesian nonparametric mixture of experts for high-dimensional inverse problems](#). *Preprint. hal-04015203*, March 2023.
- 2022 TrungTin Nguyen, Hien Duy Nguyen, Faicel Chamroukhi, and Florence Forbes. [A non-asymptotic approach for model selection via penalization in high-dimensional mixture of experts models](#). **Electronic Journal of Statistics**, volume 16, pages 4742 – 4822, 2022.
- 2021 TrungTin Nguyen. [Model Selection and Approximation in High-dimensional Mixtures of Experts Models: From Theory to Practice](#). Ph.D. Thesis, Normandie Université, December 2021.

Simulation-based inference

- 2023 Hien Duy Nguyen, TrungTin Nguyen, Julian Arbel, and Florence Forbes. [Concentration results for approximate Bayesian computation without identifiability](#). *Preprint. hal-03987197*, February 2023.
- 2022 Florence Forbes, Hien Duy Nguyen, TrungTin Nguyen, and Julian Arbel. [Summary statistics and discrepancy measures for approximate Bayesian computation via surrogate posteriors](#). *Statistics and Computing*, volume 32, page 85, October 2022.

Selected Conference, Seminar, Workshop Presentations

- 12/2022 [2022 IMS International Conference on Statistics and Data Science \(ICSDS\)](#), Italy (Oral presentation).
- 10/2022 [BNP13 – 13th Conference on Bayesian Nonparametrics](#), Puerto Varas, Chile (Oral presentation).
- 06/2022 [53èmes Journées de Statistique de la Société Française de Statistique](#), Lyon, France (Oral presentation).
- 04/2021 [MiMo 2021: Workshop on Mixture Models](#), Université de Rouen Normandie, France (Invited speaker).

Teaching Experiences

- 01-04/2023: [Statistical analysis and document mining \(Complementary Course, 16.5h\)](#). Responsible professor: [Pedro Rodrigues](#), *Master 1 of Applied Mathematics, Université Grenoble Alpes*, France.
- 09-12/2022: [Méthodes statistiques pour la biologie - STA301 \(Travaux Dirigés, 23h\)](#). Responsible professor: [Julien Chevallier](#), *Licence Sciences et Technologies - BIO, Université Grenoble Alpes*, France.
- Fall 2018: [Mathematical and numerical foundations of modeling and simulation using partial differential equations \(Teaching Assistant, 24h\)](#). Responsible professor: [Jing-Rebecca Li \(IDEFIX team, Inria\)](#), *French-Vietnam Master 2 in Applied Mathematics, VNU-HCM*, Vietnam.
- Fall 2017: [Principles of Mathematical Analysis \(Teaching Assistant, 30h\)](#). Responsible professor: [Duong Minh Duc](#), *Bachelor in Mathematics and Computer Science, VNU-HCM*, Vietnam.

Fellowships and Awards

- 10/2022 [BNP13 Junior Travel Award](#) (1000 USD) granted by [International Society for Bayesian Analysis](#).
- 2022-2025 [Qualifications aux fonctions de Maître de Conférences](#). Section 26. [Mathématiques appliquées et applications des mathématiques](#). **Designated rapporteurs:** [Fabienne Comte](#), and [Fanny Villers](#).
- 2022–2023 Postdoctoral Fellowships granted by [Inria centre at the University Grenoble Alpes](#), France.
- 2018–2021 Ph.D. Scholarship granted by [Ministère de l'Enseignement Supérieur et de la Recherche](#), France.
- 2017 Highest Distinction Graduation Award and Outstanding Student Award, [VNU-HCM](#), Vietnam.
- 2014–2017 Scholarship of the National Program for the Development of Mathematics 2010–2020 of [Vietnam Institute for Advanced Study in Mathematics \(VIASM\)](#), Vietnam.

Collaborators (in random order)

1. [Geoff McLachlan](#): Professor of Statistics (Personal Chair), [School of Mathematics and Physics, University Of Queensland](#), Brisbane, Australia.
2. [Florence Forbes](#): Senior Researcher (Director of Research), [Statify Team, Inria centre at the University Grenoble Alpes](#), Grenoble, France.
3. [Faïcel Chamroukhi](#): Full Professor of Statistics and Data Science, [Université de Caen Normandie, Lab. of Mathematics Nicolas Oresme \(LMNO\), UMR CNRS 6139](#); Scientific head of Data Science and Artificial Intelligence, [IRT SystemX](#), the Research & Technology Organisation of [Université Paris-Saclay](#), Palaiseau, France.
4. [Hien Duy Nguyen](#): Associate Professor, [School of Computing, Engineering and Mathematical Sciences, La Trobe University](#), Bundoora, Victoria, Australia.
5. [Nhat Ho](#): Assistant Professor, [Department of Statistics and Data Sciences, The University of Texas at Austin](#), Austin, Texas, United States.
6. [Julian Arbel](#): Associate Researcher (Chargé de Recherche), [Statify Team, Inria centre at the University Grenoble Alpes](#); [Laboratoire Jean Kuntzmann](#), member of [Université Grenoble Alpes Grenoble](#), Grenoble, France.

7. [Binh Nguyen](#): Associate Professor of Computer Science and the Head of the Department of Computer Science, Faculty of Mathematics and Computer Science, University of Science (VNUHCM-US), Vietnam National University (VNUHCM), Ho Chi Minh City, Vietnam.
8. [Quang Pham](#): Research Scientist, Machine Intellection department, Institute for Infocomm Research (I2R), A*Star, Singapore.
9. [Huy Nguyen](#): Phd Student, Department of Statistics and Data Sciences, The University of Texas at Austin, Austin, Texas, United States.
10. [Khai Nguyen](#): Phd Student, Department of Statistics and Data Sciences, The University of Texas at Austin, Austin, Texas, United States.
11. [Dung Ngoc Nguyen](#): Postdoctoral Research Fellow in Statistics, Department of Statistical Sciences, University of Padova, Padova, Italy.
12. [Ho Minh Duy Nguyen](#): PhD Candidate, Max Planck Research School for Intelligent Systems & DFKI, Stuttgart, Germany.
13. [Giang Truong Do](#): Research Assistant, University of Tennessee, Tennessee, United States.
14. [Le Huy Khiem](#): Research Assistant, Vin University, Hanoi, Vietnam.

Professional Services

Journal Reviewing (See certificate)

Journal of the American Statistical Association (Taylor Francis): 1 paper.

Statistics and Computing (Springer): 2 papers.

Computational Statistics and Data Analysis (Elsevier): 4 papers.

Neurocomputing (Elsevier): 1 paper.

Biometrical Journal (Wiley): 2 papers.

Australian & New Zealand Journal of Statistics (Wiley): 2 paper.

Communications in Statistics - Theory and Methods (Taylor Francis): 2 papers.

Conference Reviewing/Program Committee

Proceedings of the Research School on Statistics and Data Science (RSSDS 2019) (Springer): 2 papers

Editorial Board

International Journal of Machine Intelligence and Sensory Signal Processing (Inderscience): Associate Editors

Referees

Hien Duy Nguyen

Associate Professor

*School of Computing, Engineering
and Mathematical Sciences*

La Trobe University, Australia

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Florence Forbes

Senior Researcher

Head of the Statify team

Inria centre at the University Grenoble Alpes, France

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Faïcel Chamroukhi

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Head of Data Science and Artificial Intelligence

IRT SystemX, France

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Geoffrey McLachlan

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Nhat Ho

Assistant Professor

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The University of Texas at Austin, United States

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Julyan Arbel

Associate Researcher

Associate Researcher of the Statify team

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