TrungTin Nguyen

Curriculum Vitae (Short)

Postdoc at Statify Team - Inria
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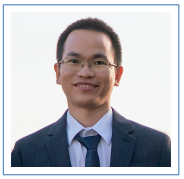
Long CV Version, October 27, 2023



"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

2023–2024 **Postdoctoral Research Fellow**, *School of Mathematics and Physics*, *The University Of Queensland*, Queensland, France.
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 Univeristy 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, TrungTin Nguyen, Quang Pham, 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, Accepted in main conference***, 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 in Gaussian Mixture of Experts. *arXiv preprint arXiv:2305.03288,* ***Accepted at NeurIPS 2023 as a spotlight***, 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 theory for model selection in high-dimensional mixture of experts via joint rank and variable selection. In ***Australasian Joint Conference on Artificial Intelligence 2023***, Brisbane, Australia, 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, Julyan 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 Julyan 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.

Professional Services

Journal Reviewing

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

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

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

Neurocomputing (Elsevier): 1 paper. See certificate.

Biometrical Journal (Wiley): 2 papers. See certificate.

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

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

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