TrungTin Nguyen

Curriculum Vitae

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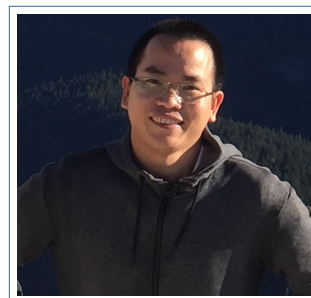Lab of Mathamatics Nicolas Oresme-LMNO,
UMR CNRS 6139,
Université de Caen Normandie.
September 15, 2021

Academic Appointments

2022–2023   **Postdoctoral Research Fellow**, *Inria Grenoble-Rhône-Alpes Research Centre*, Grenoble, France.
Mentors: Senior Researcher Florence Forbes, Senior Lecturer Hien Duy Nguyen, and Associate Researcher Julyan Arbel.
Topic: Simulation-based inference for Bayesian inverse problems.

Tertiary Education

2018–2021   **Ph.D. Student in Statistics and Data Science**, *Université de Caen Normandie*, Caen, France.
Advisor: Professor Faïcel Chamroukhi.
Thesis title: Model selection and approximation in high-dimensional mixtures of experts models: from theory to practice.

2017–2018   **Master of Science, Technology and Health**, *Université d'Orléans*, Orléans, France, GPA: 18/20.
Master 2 Program of Mathematics. Major in Applied Mathematics. Mention *"Très Bien"*.
Advisor: Professor Le Thi Hoai An.
Thesis title: Reinforcement learning for resource allocation problems using a partially observable Markov decision process.

2013–2017   **Bachelor of Science**, *Vietnam National University-Ho Chi Minh Univeristy of Science*, Ho Chi Minh City, Vietnam, GPA: 9.17/10.
Honors Program in Mathematics and Computer Science. Major in Probability and Statistics, minor in Numerical Analysis. Rank: 2/1557: Summa Cum Laude.
Advisor: Professor Dang Duc Trong.
Thesis title: Multiplicative censoring model.

Research Interests

Statistical learning	Supervised, unsupervised and visualization of high-dimensional data, model selection in clustering and regression for functional and heterogeneous data, statistical convergence for deep hierarchical mixtures of experts (MoE), approximate Bayesian computation.
Machine learning	Deep generative models (variational autoencoders, generative adversarial networks), reinforcement learning.
Optimization	Robust and effective optimization algorithms for deep neural network (stochastic gradient descent, Adam,...), deep hierarchical MoE (generalized expectation–maximization (EM) algorithm, EM algorithm, MM algorithm,...), DC algorithm.
Biostatistics	Statistical learning and machine learning for large biological data sets (omics data), e.g., genomics, transcriptomics and proteinomics.

Publications

Model selection in mixture of experts models

2021 TrungTin Nguyen, Hien Duy Nguyen, Faicel Chamroukhi, and Florence Forbes. A non-asymptotic penalization criterion for model selection in mixture of experts models. *arXiv preprint arXiv:2104.02640. Under review, Electronic Journal of Statistics*, 2021.

2021 TrungTin Nguyen, Faicel Chamroukhi, Hien Duy Nguyen, and Florence Forbes. Non-asymptotic model selection in block-diagonal mixture of polynomial experts models. *arXiv preprint arXiv:2104.08959. Under review, Journal of Multivariate Analysis*, 2021.

2020 TrungTin Nguyen, Hien D Nguyen, Faicel Chamroukhi, and Geoffrey J McLachlan. An l_1-oracle inequality for the lasso in mixture-of-experts regression models. *arXiv preprint arXiv:2009.10622. Under review, ESAIM: Probability and Statistics*, 2020.

Approximate Bayesian computation

2021 Florence Forbes, Hien Duy Nguyen, TrungTin Nguyen, and Julyan Arbel. Approximate Bayesian computation with surrogate posteriors. hal-03139256. *Submitted*, February 2021.

Approximation capabilities of the mixture of experts models

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, Faicel Chamroukhi, Hien D Nguyen, and Geoffrey J McLachlan. Approximation of probability density functions via location-scale finite mixtures in lebesgue spaces. *arXiv preprint arXiv:2008.09787. Under review, Communications in Statistics - Theory and Methods*, 2020.

2020 T Tin 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.

Conference, Seminar, Workshop Presentations

09/2021 Approximation and non-asymptotic model selection in mixture of experts models at Journée Thématique: "Intelligence Artificielle - Applications et défis mathématiques", INSA Rouen Normandie, Rouen, France (Poster session: Link).

06/2021 Non-asymptotic model selection in mixture of polynomial experts models at MHC2021 Mixtures Hidden Markov model Clustering, Institut de Mathématique d'Orsay, Paris, France (Poster session: Link).

04/2021 Non-asymptotic penalization criteria for the Gaussian-gated localized mixture of experts regression models at MiMo 2021: Workshop on Mixture Models, Laboratoire de Mathématiques Raphaël Salem, Université de Rouen Normandie, France (Invited speaker: Slide).

Projects

2019–2021 **Member of the LANDER (Latent Analysis, Adversarial Networks, and DimEnsionality Reduction)**.
- Principal investigator:
  - Florence Forbes (Mistis Inria Grenoble Rhone-Alpes, France),
  - Hien Duy Nguyen (La Trobe University, Melbourne, Bundoora, Australia).
- Other participants:
  - Queensland University of Technology, Brisbane, Australia,
  - University of Queensland, Brisbane, Australia,
  - Swinburne University of Technology, Melbourne, Australia
  - Université de Caen Normandie, France.
- Website: `https://team.inria.fr/statify/projects/lander/`
- My submitted publications in this project: *A non-asymptotic penalization criterion for model selection in mixture of experts models* and *Non-asymptotic model selection in block-diagonal mixture of polynomial experts models*.

Professional Memberships

08/2021-
12/2023
Institute of Mathematical Statistics (IMS).

01/2020-
12/2021
International Society for Bayesian Analysis (ISBA).

Professional Services

Journal reviewing

Computational Statistics and Data Analysis (Elsevier): 2. See certificate.

Biometrical Journal (Wiley): 1. See certificate.

Communications in Statistics - Theory and Methods (Taylor Francis): 1. See certificate.

Conference reviewing/Program Committee

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

Fellowships and Awards

2018–2021 Ph.D. scholarship in Statistics and Data Science granted by Ministère de l'Enseignement Supérieur et de la Recherche, France.

2017 Highest Distinction Graduation Award, Vietnam National University–Ho Chi Minh University of Science.

2014–2017 Scholarship of the National Program for the Development of Mathematics 2010–2020 of Vietnam Institute for Advanced Study in Mathematics (VIASM).

2013–2017 Outstanding Student Award, Deparment of Mathematics and Computer Science, Vietnam National University–Ho Chi Minh University of Science.

Research Experiences

Inria Grenoble-Rhône-Alpes Research Centre.

09/2020–
01/2021
Visiting Doctoral Fellowship: 4 months .
- Collaboration: Florence Forbes, Senior Researcher (Director of Research) at INRIA Grenoble Rhone-Alpes, head of team Statify.
- Abstract: Non-asymptotic penalization criteria for the Gaussian-gated localized mixture-of-experts regression models.

Lab of Mathematics Nicolas Oresme, Université de Caen Normandie, France.

2018–present ***Ph.D. Thesis: Deep Mixtures-of-Experts for Unsupervised Feature Learning***.
- Advisor: Professor Faïcel Chamroukhi, Lab of Mathematics Nicolas Oresme LMNO-UMR CNRS 6139, Université de Caen Normandie, Caen, France.
- Abstract: This Ph.D. thesis aims to investigate deep learning within a statistical MoE model. The expected results are the following:
  - Study the approximation capabilities of the Deep MoE architecture (Finite Mixture Model is a special case).
  - Propose and study statistical Deep MoE models with desirable statistical properties (for example, a non-asymptotic model selection) and learning algorithms for representation, clustering and prediction for large-scale datasets within a parallel high-performance computing framework.
  - Perform the numerical experiments focused on: unsupervised time series, functional data representation, large-scale unsupervised bio-acoustic signal representation, and the unsupervised representation of large-scale health care data.

Theoretical and Applied Computer Science Laboratory LITA, Université de Lorraine, France.

2017–2018 ***Master Thesis: Reinforcement learning for resource allocation problems using a partially observable Markov decision process (POMDP)***.
- Advisor: Professor Le Thi Hoai An, director of Theoretical and Applied Computer Science Laboratory LITA, Université de Lorraine, France.
- Abstract: I have generalized successfully Reinforcement Learning algorithms, which are created by my Advisor for Markov Decision Process, to the more general POMDP framework by using the DC (Difference of Convex functions) programming and DCA (DC Algorithms) for a realistic application, fleet management.
- Grade: 17/20.

Vietnam National University–Ho Chi Minh Univeristy of Science, Vietnam.

2016–2017 ***Bachelor Thesis: Multiplicative censoring model***.
- Advisor: Professor Dang Duc Trong, head of faculty Mathematics and Computer Science, Vietnam National University-Ho Chi Minh Univeristy of Science, Vietnam.
- Abstract: I studied classical kernels to estimate density f from the multiplicative censoring model, given by $Y_i = X_i U_i, 1 \leq i \leq n$, where $(X_i)_{1 \leq i \leq n}$ are i.i.d. with unknown density f in $\mathbf{R}$, $(U_i)_{1 \leq i \leq n}$ are i.i.d. with uniform distribution $\mathcal{U}([0, 1])$. Only the sample $(Y_i)_{1 \leq i \leq n}$ is observed and $(U_i)_{1 \leq i \leq n}$ and $(X_i)_{1 \leq i \leq n}$ are independent sequences. Then simulation experiments are implemented by using software $\mathbf{R}$ with different bandwidth selection procedures.
- Grade: 10/10.

Teaching Experiences

Fall 2018: **Teaching Assistant, Mathematical and numerical foundations of modeling and simulation using partial differential equations instructed by Professor Jing-Rebecca Li (Ecole Polytechnique, France)**, *French-Vietnam Master 2 in Applied Mathematics*, *Vietnam National University–Ho Chi Minh Univeristy of Science*, Vietnam.

Fall 2017: **Teaching Assistant, Principles of Mathematical Analysis**, *Department of Mathematics and Computer Science, Vietnam National University–Ho Chi Minh Univeristy of Science*, Vietnam.

Selected Academic Experiences

07/2019 **Participated in 3rd International Summer School on Deep Learning (39 hours)**, *Warsaw, Poland*.
Including some featured courses:
- *Deep Generative Models* by Aaron Courville (University of Montréal, Canada).
- *Dive into Deep Learning* by Alex Smola (Amazon, USA).
- *Mathematics of Deep Learning* by Rene Vidal (Johns Hopkins University, USA).

12/2018 **Attended the course "Optimization theory for Statistics and Machine Learning"**, *Caen, France*, by Dr. Hien Duy Nguyen.

| 11/2018 | **Participated to training program "Apprentissage statistique et science des données (18 hours)**, *Caen, France*, by Professor Faicel Chamroukhi. |
| 06-09/2018 | **Accomplished an online course Deep Learning Specialization**, *Stanford University, USA*, instructed by Professor Andrew Ng. |

Including 5 courses:
- Neural Networks and Deep Learning. Grade: 100%.
- Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization. Grade: 100%.
- Structuring Machine Learning Projects. Grade: 98.3%.
- Convolutional Neural Networks. Grade: 98.9%.
- Sequence Models. Grade: 100%.

Course Certificates:
https://www.coursera.org/account/accomplishments/specialization/4HZQ4ET4HCSQ

Languages

Vietnamese	**Mother tongue**	
English	**IELTS 7.0/9.0**	*Excellent in reading, listening, good at writing and speaking.*
French	**Basic**	*Basic words and phrases only.*

Computer Skills

| Programming Languages | R, Python, MATLAB, C++, SAS. |
| Operating Systems | Ubuntu, Window. |

Referees

Faïcel Chamroukhi
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Hien Duy Nguyen
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Department of Mathematics and Statistics
La Trobe University, Melbourne, Australia
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