Trang H. Tran

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FIELDS OF INTEREST

Optimization and Time Series Application in Machine Learning

EDUCATION

2020 – Present **School of Operations Research and Information Engineering, Cornell University**
PhD Candidate, Major: Operations Research
Advisor: Prof. Katya Scheinberg. Co-advisor: Dr. Lam M. Nguyen

2015 – 2019 **Hanoi National University of Education**
Honor Class, Faculty of Mathematics
Degree of Bachelor. Classification: Excellent

RESEARCH EXPERIENCE

05 – 08/2024 **Siegel PiTech PhD Impact Fellowship**
ADAPT Community Network, New York City, NY
Supervisors: Ronak Parikh

05 – 08/2023 **AI Research Intern**
IBM Research, Thomas J. Watson Research Center, Yorktown Heights, NY
Supervisors: Dr. Lam M. Nguyen, Dr. Kyongmin Yeo, Dr. Nam H. Nguyen

05 – 08/2022 **AI Research Intern**
IBM Research, Thomas J. Watson Research Center, Yorktown Heights, NY
Supervisor: Dr. Lam M. Nguyen

PUBLICATIONS

2024 **Shuffling Momentum Gradient Algorithm for Convex Optimization.**
Trang H. Tran, Quoc Tran-Dinh, Lam M. Nguyen
Vietnam Journal of Mathematics (**VJOM**)
Special issue dedicated to Dr. Tamás Terlaky on the occasion of his 70th birthday, 2024

2023 **On the Convergence to a Global Solution of Shuffling-Type Gradient Algorithms**
Lam M. Nguyen*, **Trang H. Tran***
Conference on Neural Information Processing Systems (**NeurIPS 2023**) (26.1% acceptance rate)

2022 **Nesterov Accelerated Shuffling Gradient Method for Convex Optimization.**
Trang H. Tran, Katya Scheinberg, Lam M. Nguyen
International Conference on Machine Learning (**ICML 2022**) (21.9% acceptance rate)

2021 **SMG: A Shuffling Gradient-Based Method with Momentum**
Trang H. Tran, Lam M. Nguyen, Quoc Tran-Dinh
International Conference on Machine Learning (**ICML 2021**) (21.47% acceptance rate)

PEER-REVIEWED WORKSHOP PAPERS

2023 **Stochastic FISTA Step Search Algorithm for Convex Optimization**
Trang H. Tran, Lam M. Nguyen, Katya Scheinberg
Conference on Neural Information Processing Systems (**NeurIPS 2023**),
Workshop on Optimization for Machine Learning (**OPT 2023**)

PREPRINTS

2024 **Stochastic ISTA/FISTA Adaptive Step Search Algorithms for Convex Composite Optimization**
Lam M. Nguyen, Katya Scheinberg, **Trang H. Tran** (alphabetical order)
Technical report, arXiv preprint, 2024 *(Under Review)*

2023 A Univariate Pretrain-Finetune Approach for Time Series Using Supervised Contrastive Learning
Trang H. Tran, Lam M. Nguyen, Kyongmin Yeo, Nam Nguyen, Roman Vaculin
Technical report, arXiv preprint, 2023 *(Under Review)*

2023 Learning Robust and Consistent Time Series Representations: A Dilated Inception-Based Approach
Anh Duy Nguyen, **Trang H. Tran**, Hieu H. Pham, Phi Le Nguyen, Lam M. Nguyen
Technical report, arXiv preprint, 2023 *(Under Review)*

2023 An End-to-End Time Series Model for Simultaneous Imputation and Forecast
Trang H. Tran, Lam M. Nguyen, Kyongmin Yeo, Nam Nguyen, Dzung Phan, Roman Vaculin, Jayant Kalagnanam
Technical report, arXiv preprint, 2023 *(Under Review)*

2022 Finding Optimal Policy for Queueing Models: New Parameterization
Trang H. Tran, Lam M. Nguyen, Katya Scheinberg
Technical report, arXiv preprint, 2022

2022 New Perspective on the Global Convergence of Finite-Sum Optimization
Lam M. Nguyen*, **Trang H. Tran***, Marten van Dijk
Technical report, arXiv preprint, 2022 (*Under Review*)

PROFESSIONAL ACTIVITIES

02/2023 Workshop Organizer
When Machine Learning meets Dynamical Systems: Theory and Applications.
Lam M. Nguyen, **Trang H. Tran**, Wang Zhang, Subhro Das and Tsui-Wei Weng.
Workshop at the 37th Conference on Artificial Intelligence (AAAI 2023)

2020 – Present Program Committee – Reviewer (peer-reviewed conferences)
International Conference on Machine Learning (ICML 2020 - 2024)
Conference on Neural Information Processing Systems (NeurIPS 2021 - 2024)
International Conference on Learning Representations (ICLR 2021 - 2024)
Conference on Artificial Intelligence (AAAI 2022)
International Conference on Artificial Intelligence and Statistics (AISTATS 2021 - 2024)
Conference on Uncertainty in Artificial Intelligence (UAI 2022 - 2023)
Conference on Computer Vision and Pattern Recognition (CVPR 2023)

2021 – Present Reviewer (peer-reviewed journal)
Journal of Machine Learning Research (2022 – Present)
Journal of Optimization Theory and Applications (2022 – Present)
Machine Learning (2021 – Present)
Neural Networks (2022 – 2023)
IEEE Transactions on Neural Networks and Learning Systems (2022)
IEEE Transactions on Signal Processing (2021)

2022 – Present Member
Editorial Board, Machine Learning Journal

2021 – Present Session Chair / Organizer
INFORMS Annual Meeting 2023 – "First-Order Methods for Machine Learning"
INFORMS Annual Meeting 2022 – "Optimization for Machine Learning"
INFORMS Annual Meeting 2021 – "Recent Advances in Stochastic Gradient Algorithms"

2021 Program Committee – Reviewer (workshops)
Optimization for Machine Learning: Beyond Worst-case Complexity (OPT 2021 – NeurIPS 2021 Workshop)
New Frontiers in Federated Learning: Privacy, Fairness, Robustness, Personalization and Data Ownership (NFFL 2021 – NeurIPS 2021 Workshop)

PATENTS APPLICATIONS

[3] A Multivariate Time Series Model Which Simultaneously Learns The Spatial And Temporal Relation.
Filed on January 5th, 2023.
Lam M. Nguyen, **Trang H. Tran.**

[2] Time Series Forecasting Using Multivariate Time Series Data With Missing Values.
Filed on February 1st, 2023.
Lam M. Nguyen, **Trang H. Tran**, Kyongmin Yeo, Nam Nguyen, Dzung Phan, Roman Vaculin, Jayant Kalagnanam.

[1] Training A Neural Network Using an Accelerated Gradient with Shuffling.
Filed on July 14th, 2022.
Lam M. Nguyen, **Trang H. Tran.**

HONORS & AWARDS

2024 Cornell Tech PhD Impact Fellowship
Siegel Family Endowment PiTech PhD Impact Fellowship, Summer 2024

2023 NeurIPS 2023 Scholar Award
Conference on Neural Information Processing Systems (NeurIPS 2023) (Travel Grant)

2022 UAI 2022 Top Reviewer
Conference on Uncertainty in Artificial Intelligence (UAI 2022)

2022 ICML 2022 Participation Grant
International Conference on Machine Learning (ICML 2022)

2021 ICLR 2021 Outstanding Reviewer
International Conference on Learning Representations (ICLR 2021) Reviewer Award (Top 10%)

2020 ORIE Field Fellowship
Eleanor and Howard Morgan PhD'68 Graduate Fellowship, Fall 2020

2019 Young Talent Scholarship Programme 2019
From the Vingroup Innovation Foundation (VINIF) for outstanding students who are pursuing the domestic postgraduate study programmes

2016 – 2018 Students Scholarship in National Program
for the Development of Mathematics until 2020

2016 First Prize on Algebra
In Vietnam Mathematics Competition for University Students (nationwide award)

RESEARCH PROJECTS

2023 – Present Foundation Model for Time Series Study
Summer intern project at IBM - working under the supervision of Dr. Lam M. Nguyen, Dr. Kyongmin Yeo and Dr. Nam H. Nguyen
– Propose a pre-training data processing procedure to build a diverse pool of time series representation learning.
– Propose a contrastive learning approach to pretrain and finetune the time series datasets.

2022 – Present Stochastic ISTA/FISTA Adaptive Step Search Algorithms for Convex Composite Optimization
Working under the supervision of Prof. Katya Scheinberg
– Propose a new algorithm with fast iterative shrinkage-thresholding (FISTA) to solve the stochastic convex optimization problem, which integrates the acceleration of FISTA step with a framework that searches for descent directions.
– Our complexity matches with the iteration complexity of deterministic Nesterov's accelerated momentum and FISTA algorithm, which is optimal in convex setting.
Published as a workshop paper at OPT 2023 - NeurIPS 2023

2022 – Present **Adaptive Framework for Time Series: Forecasting with Missing Data**
Summer intern project at IBM - working under the supervision of Dr. Lam M. Nguyen
– Propose an adaptive multi-task framework for time series data, which simultaneously imputes the missing entries and makes a multiple-step ahead prediction.
– Perform experiments with our framework and show good performance of our method over existing approaches in both tasks.

2022 – 2023 **On the Convergence to a Global Solution of Shuffling-Type Gradient Algorithms**
Working under the supervision of Dr. Lam M. Nguyen
– Investigate a class of non-convex function called star-M-smooth-convex, which is more general than the class of star-convex smooth functions with respect to the minimizer (in the over-parameterized settings).
– Propose a new framework for the convergence of a shuffling-type gradient algorithm to a global solution, with a relaxed set of assumptions than the PL condition on the objective function.
Published as a conference paper at NeurIPS 2023

2021 – 2022 **Nesterov Accelerated Shuffling Gradient Method for Convex Optimization**
Working under the supervision of Dr. Lam M. Nguyen and Prof. Katya Scheinberg
– Propose a new algorithm for the convex finite-sum problems, which integrates the traditional Nesterov's acceleration momentum with different shuffling sampling schemes.
– Prove an improved convergence rate in term of epochs, which is better than that of any other shuffling gradient methods in convex regime.
Published as a conference paper at ICML 2022

2020 – 2022 **Optimization for Queueing Models in Reinforcement Learning**
Working under the supervision of Prof. Katya Scheinberg and Dr. Lam M. Nguyen
– Investigate the optimization aspects of the queueing model as a Reinforcement Learning environment.
– Use the intrinsic properties of queueing network systems to optimize with probabilistic zeroth-order/first-order oracles

2020 – 2022 **New Perspective on the Global Convergence of Finite-Sum Optimization**
Working under the supervision of Dr. Lam M. Nguyen
– Present an alternative formulation for the finite-sum nonconvex optimization problems.
– Propose a novel framework that guarantees global convergence and exploits the structure of machine learning problems where the loss functions are convex.

2020 – 2021 **SMG: A Shuffling Gradient-Based Method with Momentum**
Working under the supervision of Dr. Lam M. Nguyen
– Develop a new shuffling gradient algorithm with momentum for solving the finite-sum minimization problems.
– Establish the state-of-the-art convergence rate for our method under standard assumptions using different learning rates and shuffling strategies.
Published as a conference paper at ICML 2021

TALKS

10/2023 **Stochastic Optimization Methods with Momentum.**
INFORMS Annual Meeting 2023, Phoenix, AZ

01/2023 **Shuffling Gradient Methods for Finite-sum Optimization.**
Institute of Mathematics, Vietnam Academy of Science and Technology, Hanoi, Vietnam

10/2022 **Nesterov Accelerated Shuffling Gradient Method.**
INFORMS Annual Meeting 2022, Indianapolis, IN

07/2022 **Nesterov Accelerated Shuffling Gradient Method for Convex Optimization.**
International Conference on Machine Learning (ICML 2022), Baltimore, MD

10/2021 **Shuffling Gradient-Based Methods**
INFORMS Annual Meeting 2021, Anaheim, CA

07/2021 **SMG: A Shuffling Gradient-Based Method with Momentum**
International Conference on Machine Learning (ICML 2021), virtual conference

OTHER EXPERIENCES

Teaching Assistant - Cornell University

Spring 2024 ORIE 3310 Optimization II
Fall 2022 MATH 2940 Linear Algebra for Engineers
Spring 2021 ORIE 3510 Introduction to Engineering Stochastic Processes
Holding discussion sections, grading and other duties.

Mentorship

06/2022 – 05/2023 Angelos Assos
Undergraduate student, Computer Science and Mathematics, Massachusetts Institute of Technology.
(co-advise with Dr. Lam Nguyen and Prof. Luca Daniel)

SKILLS

Programming Python, MATLAB, PyTorch, TensorFlow, Keras, CPLEX, Gurobi.
Research Optimization, Machine Learning, Time Series Analysis, Mathematical Modelling.
Language Vietnamese (native), English (proficient)

REFERENCES

Katya Scheinberg, Ph.D.
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