NHAN H. PHAM

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RESEARCH INTERESTS

Stochastic optimization methods for machine learning, deep learning, and reinforcement learning.

EDUCATION

Ph.D. in Operations Research *Aug. 2017–Present*
Department of Statistics and Operations Research
University of North Carolina at Chapel Hill · Chapel Hill, NC, USA

Graduate Study in Computer Engineering *Aug. 2015–May 2017*
Department of Computer Science and Engineering
University of Nevada, Reno · Reno, NV, USA

Bachelor of Engineering (Honor Program) in Computer Engineering *Aug. 2008–May 2013*
Department of Computer Science and Engineering
Ho Chi Minh City University of Technology · Ho Chi Minh City, Vietnam

RESEARCH EXPERIENCES

Regularization Techniques on Deep Learning *Sept. 2019–Present*
SAMSI Research Fellow, Supervisor: Dr. Quoc Tran-Dinh.

- ◇ Work under Regularization Techniques subgroup studying the principle of different regularization techniques on training Deep Neural Networks (DNNs).
- ◇ Conduct numerical experiments on different DNN models consisting two or more regularizers on both model parameters (e.g. ℓ_2-norm, max-norm constraint, etc.) and training process (dropout, batch normalization, etc.).

Hybrid Stochastic Policy Gradient Algorithm for Reinforcement Learning *Jul. 2019–Present*
Graduate Research Assistant, Supervisors: Dr. Quoc Tran-Dinh, Dr. Lam M. Nguyen.
Under review for the 23rd International Conference on Artificial Intelligence and Statistics (AISTATS 2020).

- ◇ Propose a new biased policy gradient estimator from REINFORCE/GPOMDP and adopted SARAH estimators.
- ◇ Develop a new algorithm utilizing the new estimator which is the first algorithm that has convergence guarantee to solve a composite policy optimization problem in reinforcement learning.
- ◇ Prove that the proposed algorithm achieves the best-known convergence rate over existing methods and conduct experiments to verify the advantage using OpenAI `gym` environments.

Hybrid Optimization Framework for Composite Nonconvex Optimization *Feb. 2019–Aug. 2019*
Graduate Research Assistant, Supervisors: Dr. Quoc Tran-Dinh, Dr. Lam M. Nguyen.
Under review for Mathematical Programming, preprint.

- ◇ Introduce a new stochastic gradient estimator that combines SGD and SARAH estimators and use it to develop a new algorithm for composite nonconvex optimization problems which achieves best-known convergence rate.
- ◇ Verify the effectiveness of the proposed algorithm via numerical experiments using Python and Tensorflow.

ProxSARAH: A Framework for Stochastic Composite Nonconvex Optimization *Aug. 2018–Feb. 2019*
Graduate Research Assistant, Supervisors: Dr. Quoc Tran-Dinh, Dr. Lam M. Nguyen.
Under review for Journal of Machine Learning Research (JMLR), preprint.

- ◇ Develop a new stochastic algorithm that solves composite nonconvex optimization problems which utilizes existing SARAH estimator and achieve the best-known convergence rate.
- ◇ Conduct numerical experiments to illustrate the advantage of the proposed algorithms on three examples: Non-negative PCA, classification with 3 nonconvex losses, and neural network training using Python and Tensorflow.

Autonomous Robots for Bridge Inspection *Aug. 2015–Feb. 2017*
Graduate Research Assistant, Supervisor: Dr. Hung M. La.
In Proceedings of the 54th Annual Allerton Conference on Communication, Control, and Computing, preprint.
In Proceedings of the 2017 IEEE International Conference on Robotics and Automation (ICRA), preprint.
The 33rd International Symposium on Automation and Robotics in Construction and Mining (ISARC), preprint.

- ◇ Propose a four-wheeled robot for steel bridge inspection with permanent magnets embedded inside each wheel equipped with different type of sensors: visual camera, 3D sensor, IMU for localization and mapping purposes.
- ◇ Build a controller unit with minicomputer (Intel NUC) running Robot Operating System communicating with a low-level controller (Arduino-based) for sensory data collection, implement sensor fusion and mapping algorithms.

PREPRINTS

1. Q. Tran-Dinh, **N. H. Pham**, D. T. Phan, and L. M. Nguyen. *A Hybrid Stochastic Optimization Framework for Composite Nonconvex Optimization*. arXiv:1907.03793, 2019. (Under review for Mathematical Programming)
2. **N. H. Pham**, L. M. Nguyen, D. T. Phan, and Q. Tran-Dinh. *ProxSARAH: An efficient algorithmic frame- work for stochastic composite nonconvex optimization*. arXiv:1902.05679, 2019. (Under review for Journal of Machine Learning Research)

PUBLICATIONS

1. H. M. La, T. H. Dinh, **N. H. Pham**, Q. P. Ha, and A. Q. Pham. *Automated robotic monitoring and inspection of steel structures and bridges*. Robotica, Cambridge University Press, 1-21, 2018.
2. T. D. Le, S. Gibb, **N. H. Pham**, H. M. La, L. Falk, and T. Berendsen. *Autonomous Robotic System using Non-Destructive Evaluation methods for Bridge Deck Inspection*. In Proceedings of the 2017 IEEE International Conference on Robotics and Automation (ICRA), May 29-June 3, 2017, Singapore.
3. **N. H. Pham** and H. M. La. *Design and Implementation of an Autonomous Robot for Steel Bridge Inspection*. In Proceedings of the 54th Annual Allerton Conference on Communication, Control, and Computing, pages 1-8, Sept. 27-30, 2016, Urbana-Champaign, Illinois, USA.
4. **N. H. Pham**, H. M. La, Q. P. Ha, S. N. Dang, A. H. Vo, and Q. H. Dinh. *Visual and 3D Mapping for Steel Bridge Inspection Using a Climbing Robot*. The 33rd International Symposium on Automation and Robotics in Construction and Mining (ISARC), pages 1-8, July 18-21, 2016, Auburn, Alabama, USA.
5. T.-D. D. Phan, **N. H. Pham**, K.-N. Le-Huu, and A.-V. D. Dinh. *Quadrotor Helicopter: A Practical Design Approach*. IEICE International Conference on Integrated Circuits, Design and Verification, pp.156-163, 2013, Ho Chi Minh, Vietnam.

SKILLS & QUALIFICATIONS

Technical Python, Tensorflow, Keras, C/C++, Matlab
Other skills Linux Development Environment, Robotics

OTHER EXPERIENCES

Graduate Teaching Fellow *Spring 2019–Summer 2019*
STOR 113: Decision Models for Business and Economics
Department of Statistics and Operations Research · University of North Carolina at Chapel Hill

Graduate Teaching Assistant *Fall 2017–Fall 2018*
STOR 113: Decision Models for Business and Economics
STOR 155: Introduction to Data Models and Inference
Department of Statistics and Operations Research · University of North Carolina at Chapel Hill

Graduate Teaching Assistant *Fall 2015–Spring 2017*
CPE 301: Embedded Systems Design
CS 302: Data Structures
Department of Computer Science and Engineering · University of Nevada, Reno

Lab Assistant *Jun. 2013–Apr. 2015*
Renesas SuperH Lab
Department of Computer Science and Engineering · Ho Chi Minh City University of Technology

Organizing Assistant *2014*
BKIT Car Rally
Department of Computer Science and Engineering · Ho Chi Minh City University of Technology

Robot Control Software Developer *2013*
BK4 aka BKIT Number One Team · Vietnam National Robot Contest
Department of Computer Science and Engineering · Ho Chi Minh City University of Technology

Embedded Software Developer *2012*
ChipFC Team · Texas Instruments National MCU Design Contest–**1st Place Winner**

HONORS & AWARDS

Graduate Access Grant *Spring 2016–Spring 2017*
Regents' Higher Education Opportunity Award
University of Nevada, Reno · Reno, NV

International Graduate Student Award *Spring 2016–Spring 2017*
Regents' Higher Education Opportunity Award
University of Nevada, Reno · Reno, NV

Poster Exhibition–1st Place Winner *2016*
CSE Graduate Club–Department of Computer Science and Engineering
University of Nevada, Reno · Reno, NV

Outstanding Academic Student Scholarship *2008–2013*
Department of Computer Science and Engineering
Ho Chi Minh City University of Technology · Ho Chi Minh City, Vietnam