

NHAN H. PHAM

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RESEARCH INTERESTS

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

EDUCATION

Ph.D., Operations Research, Univ. of North Carolina at Chapel Hill

Aug. 2017 - Present

Graduate Study, Computer Science & Eng., Univ. of Nevada, Reno

Aug. 2015 - May 2017

B.Eng., Computer Science & Eng., Ho Chi Minh City Univ. of Tech.

Aug. 2008 - May 2013

RESEARCH EXPERIENCES

Regularization Techniques on Deep Learning

Sept. 2019 - Present

SAMSI Research Fellow, Supervisor: Dr. Quoc Tran-Dinh.

- Working 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, Supervisor: 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 estimator.
- 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, Supervisor: 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, Supervisor: 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](#).

- 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.
- Integrate a minicomputer (Intel NUC) running Robot Operating System with a low-level controller (Arduino-based) for sensory data collection and implement robot controller.

SKILLS & QUALIFICATIONS

Technical Python, Tensorflow, Keras, C/C++, Matlab

Other skills English (professional proficiency), Linux development environment, Robotics

OTHER EXPERIENCES

Graduate Teaching Fellow

Spring 2019 - Summer 2019

STOR 113: Decision Models for Business and Economics

Graduate Teaching Assistant

Fall 2017 - Fall 2018

STOR 113: Decision Models for Business and Economics, STOR 155: Introduction to Data Models and Inference