Haoze He

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EDUCATION

New York University (NYU) **New York, U.S.**

Master of Science, Specialized in Computer Engineering *Aug. 2021–present*

- **Courses:** Machine Learning, Deep Learning, Intro to High Performance Machine Learning, Natural Language Processing with Representation Learning

The Chinese University of Hong Kong (CUHK) **Shenzhen, China**

Bachelor of Science, Specialized in Computer Science and Engineering *Sep. 2016–May 2020*

- **Courses:** Software Engineering, Discrete Mathematics, Computer Architecture, Operating System

Tsinghua University (THU) **Beijing, China**

Exchange Program in Computer Science *May 2018–Jun. 2018*

- **Course:** Discrete Mathematics

PUBLICATIONS

- **Haoze He,** Dube Parijat, "*Accelerating Parallel Stochastic Gradient Descent via Non-blocking Mini-batches*", Conference on Machine Learning and Systems (MLSys), Submitted, Oct.2022
- **Haoze He**, Dube Parijat *"RCD-SGD: Resource-Constrained Distributed SGD in Heterogeneous Environment via Submodular Partitioning"*, IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Submitted, Oct.2022
- Chaoxun Guo, Zhixing Jiang, **Haoze He,** David Zhang, *"Pulse Signal Acquisition and Analysis for Disease Diagnosis: A review"*, Computers in Biology and Medicine, Accepted, Nov. 2021
- **Haoze He,** Anna Choromanska, "*Local Leader Decentralized Stochastic Gradient Descent*", International Conference on Machine Learning (ICML), to be submitted, Nov.2022

ACADEMIC EXPERIENCE

Local Leader Decentralized Stochastic Gradient Descent **New York, U.S.**

Researcher, Instructor: Prof. Anna Choromanska *Sep. 2022–Nov.2022*

- Proposed a novel Local Leader decentralized SGD which can accelerate the convergence of decentralized SGD and achieve faster convergence by signing specific weights to different neighbor learners according to their performance when averaging and applying a corrective force dictated by the currently best-performing neighbor when training.
- Utilized novel model average and gradient step method to avoid convergence decelerations caused by dynamic loss function pulling local workers descending to different local minima to each other.

Accelerating Parallel Stochastic Gradient Descent via Non-blocking Mini-batches **New York, U.S.**

Researcher, Instructor: Prof. Parijat Dube *Jun. 2022–Oct.2022*

- Proposed a novel non-blocking algorithm that can be implemented on (de)centralized to achieve faster convergence, fewer delays, and shorter wall-clock time by splitting the original batch into mini-batches, accumulating the gradients, and updating the model based on finished mini-batches to solve the straggler problem.
- Proposed the general Non-blocking algorithm which is extendable to most (de)centralized SOTA algorithms and any distributed computation or consensus algorithm (federated learning, etc.) that requires frequent synchronizations.
- Presented theoretical complexity analysis, efficiency analysis, and convergence analysis of the decentralized Non-block SGD and compared it with the general decentralized SOTA algorithms including D-PSGD and MATCHA.

- Evaluated the Non-blocking idea experimental in a heterogeneous environment using CIFAR-10/100 and achieved 2 × fewer times to reach the same training loss.

Resource-Constrained SGD in Heterogeneous Environment via Submodular Partitioning **New York, U.S.**
Researcher, Instructor: Prof. Parijat Dube *Aug. 2022–Oct.2022*

- Proposed a novel Resource-Constrained SGD algorithm to partition datasets across workers in proportion to their computational capabilities while achieving similarity in class-level feature distribution and maintaining class balance.
- Addressed the straggler problem of earlier partitioning algorithms and reduced the computational complexity by a factor proportional to the number of classes in the dataset.
- Proposed general resource-constrained distributed SGD that is extendable to most baseline distributed SGD SOTA algorithms and achieved faster convergence as well as shorter wall-clock training time.
- Evaluated the RCD-SGD algorithm using two different submodular functions and compare it with SOTA baselines including MATCHA and D-PSGD. By achieving approximately IID partitioning of the dataset, RCD-SGD converged faster, communicated less, and obtained up to 32% speedup in wall-clock time when compared with the baselines. The final model also had slightly better loss and improved the final accuracy by 1.1%.

Pulse Signal Acquisition and Analysis for Disease Diagnosis **Shenzhen, China**
Member, Instructor: Prof. David Zhang *Aug. 2020–May. 2021*

- Utilized cubic spline interpolation and a four-layer wavelet filter to eliminate the inevitably noise caused by human jitters, respiratory waves, and electromagnetic noise from circuits and sensors.
- Implemented LSTM, 7-layer CNN, SVM, SVC, Nu-SVC, Linear SVC, KNN, Bayesian, CRC in pulse wave datasets.
- Participated in the survey paper writing including acquisition system design, pulse wave signal pre-processing, feature extraction, and pulse signals classification.

Improvement on the Deep Affinity Network (DAN) **Shenzhen, China**
Member, Instructor: Prof. Rui Huang *Sep. 2018–Feb. 2019*

- Programmed and improved the tracking of the DAN with PyTorch.
- Visualized and evaluated the tracking results in three inputs, which were created based on detecting the MOT17 dataset using DPM, FRCNN, and SDP detector respectively.
- Connected the tracking implemented based on DAN with the detection on the server.

Biometrically Enhanced Intelligent Smartphone Locking Control System **Shenzhen, China**
Chief Technology Officer, Instructor: Prof. Rui Huang *May 2017–Dec. 2018*

- Brainstormed product designs and process management of the smart lock system.
- Developed a QR code scanning function and identification function in Raspberry Pi by using Python.
- Implemented an encryption function for the Android operating system by using Java.

PATENTS

- **Haoze He**, Rui Huang, Xiang Zhang, *Biometrically Enhanced Intelligent Smartphone Locking Control System*, China, 201811345387.9, 2019-03-01.
- Zhixia Zheng, **Haoze He**, Saiqin Huang, *Anode Bonding Device*, China, 201720512308.3, 2018-06-12.

HONORS

- Top 3% among more than 600 teams and received 500,00 dollars venture capital from Shenzhen Galaxy Holding Group, The 10th China (Shenzhen) Innovation & Entrepreneurship International Competition, Aug. 2018

SKILLS & HOBBIES

- **Programming Languages:** Proficient in Python, Java, C, C++, MATLAB, and R
- **Open-Source Software Library:** PyTorch, Keras, TensorFlow, OpenCV, scikit-learn, IM Learn