

Jinkun Lin

Github: <https://github.com/lazycal>

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EDUCATION

- **New York University** New York, USA
Ph.D. in Computer Science 09/2019 – Present
- **Tsinghua University** Beijing, China
B.Eng. in Computer Science and Technology 08/2015 – 07/2019

RESEARCH & INTERNSHIP EXPERIENCE

- **NYU System Group, New York University** New York, USA
Research Assistant, *Machine Learning Systems and Reliability, Networking* 09/2019 – Present
Advisor: Prof. Jinyang Li & Prof. Aurojit Panda
 - **AME**: A new metric to measure the contribution of each training data on ML predictions.
 - * Designed an efficient AME estimator by exploiting the sparsity of data contributions using LASSO.
 - * Applied Knockoffs to select the data with high contribution with a controlled false selection rate.
 - **NNSmith**: A fuzzing tool for deep learning compilers.
 - * Encoded operator specifications formally using Z3 to guarantee randomness in DNNs generation.
 - * Used bidirectional graph insertion and attribute binning to guarantee diversity in the attributes generated.
 - * Proposed gradient-based input searching to ensure the validity of each generated DNN's numerical inputs.
 - **SmartNIC Offloading**: Helping with an ongoing project that aims to offload service mesh proxy to SmartNIC.
- **AML Group, ByteDance** USA
Research Intern, *Machine Learning Compiler Reliability* 06/2021 – 09/2021
Advisor: Prof. Cheng Tan
 - Formulated common neural network operators' computation in SMT and verified the graph optimization on ResNet performed by TVM with SMT solver.
 - Explored fuzz testing on deep learning compilers.
- **PACMAN Lab, Tsinghua University** Beijing, China
Research Assistant, *High-performance Computing* 05/2018 – 07/2019
Advisor: Prof. Wenguang Chen
 - **Sparse tensor addition on GPU**:
 - * The ultimate goal is to extend TACO to GPU. TACO is a code generator that generates code for computing sparse tensor algebra on CPU. We explored how to implement efficient GPU kernels for the case of sparse tensor addition. The problem is approached by reducing to multiple rounds of segmented merge, which is then reduce to merge path.
- **ALCHEM Lab, University of Southern California** Los Angeles, USA
Research Intern, *Distributed Machine Learning* 07/2018 – 09/2018
Advisor: Prof. Xuehai Qian
 - Implemented a heterogeneity-aware decentralized training protocol for machine learning using TensorFlow.
 - Designed and conducted experiments on SVM and CNN under heterogeneous environments.
- **SenseTime Group Limited** Beijing, China
Research Intern, *Computer Vision, Optical Character Recognition* 07/2017 – 09/2017
Advisor: Ding Liang
 - Designed ray-tracing-based and GAN-based algorithms to synthesize training data for rare characters, by which the recognition accuracy was significantly improved.
- **Graphics and Geometric Computing Lab, Tsinghua University** Beijing, China
Research Assistant, *Computer Vision* 09/2016 – 01/2018
Advisor: Prof. Shi-Min Hu
 - **BiggerSelfie**: Enlarge the background environment in a selfie video by stitching with another environment video.
 - * Applied ensemble learning to improve the robustness of an algorithm used to extract the foreground portrait from a selfie video.
 - **StabNet**: First deep learning approach for video stabilization.
 - * Participated in the design and implementation of network.
 - * Generated the dataset, implemented the code, and trained the network for the feature loss alignment loss function.

PUBLICATIONS

- **NNSmith: Generating Diverse and Valid Test Cases for Deep Learning Compilers.**
Jiawei Liu^{}, Jinkun Lin^{*} (Equal Contribution), Fabian Ruffy, Cheng Tan, Jinyang Li, Aurojit Panda, Lingming Zhang.*
ASPLOS' 2023.
- **Measuring the Effect of Training Data on Deep Learning Predictions via Randomized Experiments.**
Jinkun Lin^{}, Anqi Zhang^{*} (Equal Contribution), Mathias Lécuyer, Jinyang Li, Aurojit Panda, Siddhartha Sen.*
ICML' 2022.
- **HOP: Heterogeneity-aware Decentralized Training.**
Qinyi Luo, Jinkun Lin, Youwei Zhuo, Xuehai Qian.
ASPLOS' 2019.
- **Deep Online Video Stabilization With Multi-Grid Warping Transformation Learning.**
Miao Wang, Guoye Yang, Jinkun Lin, Shaoping Lu, Ariel Shamir, Shimin Hu.
IEEE Transactions on Image Processing, 2019.
- **BiggerSelfie: Selfie Video Expansion with Hand-held Camera.**
Miao Wang, Ariel Shamir, Guoye Yang, Jinkun Lin, Guowei Yang, Shaoping Lu, Shimin Hu.
IEEE Transactions on Image Processing, 2018.

RELEVANT COURSE PROJECTS

- **Loss Rate Bounded Parameter Server** 2020
 - Followed the idea of *Rethinking Transport Layer Design for Distributed Machine Learning* and developed a PS framework based on *BytePS* with a lossy transport layer based on UDP.
 - The motivation is that tail latencies in datacenter could potentially stall the training, and that neural networks can tolerate imprecise gradients.
 - The idea is to ignore the late arriving gradient update packets.
- **KDD Cup of Fresh Air** 2018
 - Developed a framework to ease the subsequent feature engineering and evaluation.
 - Applied lightGBM and XGBoost to forecast air quality indices (AQIs) of the future 48 hours.
 - Obtained the 8th place in the overall score.
- **CPU and Flappy Bird** 2017
 - Three-week project of building a CPU in VHDL and a Flappy Bird game in assembly on that CPU.
 - Acted as the leader of the team of three members, in charge of the overall design and task assignment.
 - Implemented most part of the hardware and the software/hardware interface.
- **Virtual Guitar** 2017
 - Guitar application on FPGA, using PS/2 and Bluetooth to communicate with a keyboard and a cellphone, with the keyboard for the guitar player's right hand and a dedicated iOS application for left hand.

AWARDS & HONORS

- KDD Cup 2018 Honorable Prize (8th place) 2018
- Yixin Scholarship 2018
- Zheng Geru Scholarship 2016, 2017
- Freshmen Second Prize Scholarship 2015
- The 31st China's National Olympiad in Informatics Gold Medal 2014

PROGRAMMING SKILLS

- **Languages:** C++, Python, Go, VHDL, Java, Matlab
- **Platforms & Tools:** PyTorch, TensorFlow, OpenCV, Caffe, Spark

TEACHING EXPERIENCE

- Undergraduate TA for Fundamentals of Programming (Fall 2015), Tsinghua University
- Undergraduate TA for Computer Systems Organization (Fall 2021, CSCI-UA.201.007), New York University