Yanzhao Wu

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EDUCATION

Georgia Institute of Technology, Atlanta, Georgia, USA

- Ph.D. student in Computer Science — Aug 2017 – May 2021 (expected)
  - Area: **Machine Learning** and **Systems**
  - Focus: Deep Learning & Big Data Systems
  - Cumulative GPA: 3.88 / 4.00

University of Science and Technology of China (USTC), Hefei, Anhui, China

- Bachelor of Computer Science and Technology — Sep 2013 – Jul 2017
  - Graduated with **Honors**.
  - Cumulative GPA: 3.80 / 4.30

PUBLICATION

- **Yanzhao Wu**, Ling Liu. "Selecting and Composing Learning Rate Policies for Deep Neural Networks" (Under submission)
- **Yanzhao Wu**, Ling Liu, Juhyun Bae, Ka-Ho Chow, Arun Iyengar, Calton Pu, Wenqi Wei, Lei Yu, Qi Zhang. "Demystifying Learning Rate Polices for High Accuracy Training of Deep Neural Networks" (Under submission)
- Ka-Ho Chow, Wenqi Wei, **Yanzhao Wu**, Ling Liu. "Denoising and Verification Cross-Layer Ensemble Against Black-box Adversarial Attacks" (Under submission)
- Wenqi Wei, Ling Liu, Margaret Loper, Ka Ho Chow, Emre Gursoy, Stacey Truex, **Yanzhao Wu**. "Cross-layer Strategic Ensemble Defense against Adversarial Examples." (Accepted by IEEE ICNC 2020.)
- Ling Liu, Wenqi Wei, Ka-Ho Chow, Margaret Loper, Emre Gursoy, Stacey Truex, **Yanzhao Wu**. "Deep Neural Network Ensembles against Deception: Ensemble Diversity, Accuracy and Robustness" (Accepted by **IEEE MASS** 2019.)
- **Yanzhao Wu**, Ling Liu, Calton Pu, Wenqi Cao, Semih Sahin, Wenqi Wei, Qi Zhang. "A Comparative Measurement Study of Deep Learning as a Service Framework" (Accepted by **IEEE TSC**.)
- Ling Liu, Wenqi Cao, Semih Sahin, Qi Zhang, Juhyun Bae, **Yanzhao Wu**. "Memory Disaggregation: Research Problems and Opportunities" In 2019 IEEE 39th International Conference on Distributed Computing Systems, pp. 1664-1673. IEEE, 2019. (**ICDCS'19**)
- Wenqi Wei, Ling Liu, Stacey Truex, Lei Yu, Mehmet Emre Gursoy, **Yanzhao Wu**. "Adversarial Examples in Deep Learning: Characterization and Divergence" (Under submission)
- **Yanzhao Wu**, Wenqi Cao, Semih Sahin, and Ling Liu. "Experimental Characterizations and Analysis of Deep Learning Frameworks" In 2018 IEEE International Conference on Big Data, pp. 372-377. IEEE, 2018. (**BigData'18**)
- Ling Liu, **Yanzhao Wu**, Wenqi Wei, Wenqi Cao, Semih Sahin, and Qi Zhang. "Benchmarking Deep Learning Frameworks: Design Considerations, Metrics and Beyond." In 2018 IEEE 38th International Conference on Distributed Computing Systems, pp. 1258-1269. IEEE, 2018. (**ICDCS'18**)
- Wenqi Wei, **Yanzhao Wu**, Ling Liu. "DeepEyes: Integrating Deep Learning and Crowd Sourcing for Localization" (Southern Data Science Conference 2018 Research Track Poster).
- Pengcheng Wang, Jeffrey Svajlenko, **Yanzhao Wu**, Yun Xu and Chanchal K. Roy. "CCAligner: a token based large-gap clone detector" In Proceedings of the 40th International Conference on Software Engineering, pp. 1066-1077. ACM, 2018. (**ICSE'18**)

RESEARCH EXPERIENCE

High Accuracy and Robust Ensemble of Deep Neural Networks

- Distributed Data Intensive Systems Lab, Georgia Tech — Aug 2019 – Present
  - Supervisor: Prof. Ling Liu
  - Focus: Deep Learning, **Edge AI**
  - Goal: Design and implement an ensemble framework for improving deep neural network accuracy and optimizing inference robustness on GPUs and edge devices.

Semi-automatic Hyper-parameter Tuning for Training Deep Neural Networks

- Distributed Data Intensive Systems Lab, Georgia Tech — Aug 2018 – Aug 2019
  - Supervisor: Prof. Ling Liu
  - Focus: Deep Learning, Hyper-parameter Tuning
  - Goal: Design and implement a learning rate tuning system for improving accuracy and training efficiency.
  - Achievement: **LRBench**; Two papers under submission.

Experimental Analysis and Optimization of Deep Learning Frameworks

- Distributed Data Intensive Systems Lab, Georgia Tech — Aug 2017 – Aug 2018
  - Supervisor: Prof. Ling Liu
  - Focus: Deep Learning Frameworks, Performance Analysis
  - Goal: Analyze the hyper-parameters and basic components of Deep Learning and optimize Deep Learning Frameworks by tuning data-related and hardware-related parameters.
  - Achievement: **GTDLBench**; Papers published in ICDCS'18, BigData'18, IEEE TSC.

A Performance Study of Deep Learning with the High-performance Storage System

- Storage Systems Research Group, **IBM Research** — May 2019 – Jul 2019
  - Mentors: Dr. Daniel Waddington, Dr. Luna Xu
  - Focus: Storage Systems, Deep Learning Frameworks
  - Achievement: Conducted a comprehensive performance analysis of the high-performance storage system with different storage backends, such as **persistent memory** and SSD, with popular deep learning workloads.

Accelerating Deep Learning with Direct-to-GPU Storage

- Storage Systems Research Group, **IBM Research** — May 2018 – Aug 2018
  - Mentors: Amit Warke, Dr. Daniel Waddington
  - Focus: Storage Systems, Deep Learning Frameworks
  - Achievement: Integrated the Direct-to-GPU storage system into Caffe to obtain **over 2**$\times$ performance improvement by reducing the overhead of data transmission.

DeepEyes: A Deep Learning Powered Localization System with Multi-modal Sensors

- Distributed Data Intensive Systems Lab, Georgia Tech — Aug 2017 – May 2017
  - Supervisor: Prof. Ling Liu
  - Focus: Localization, Deep Learning
  - Achievement: Implemented an out-door/in-door localization system **without requiring the common localization infrastructure**, such as GPS, cellular network, and WiFi, with the help of deep learning models. A research track poster published in SDSC'18.

Detecting Large-gap Code Clones

- National High-Performance Computing Center (Hefei), USTC — Sep 2015 – Jul 2017
  - Supervisor: Prof. Yun Xu
  - Focus: Source Code Processing & Indexing, Edit Distance, Detection Algorithms
  - Achievement: *CCAligner: a token based large-gap clone detector* (**ICSE'18**).

Summer Research Internship on Automatic Verification

- School of Computer Science, University of Birmingham — Jul 2016 – Aug 2016
  - Supervisor: Prof. David Parker
  - Focus: *LTS* (Labeled Transition Systems) Model Checker, *Game* Model Checker
  - Achievement: Implemented *LTS* model checker and *Game* model checker for PRISM, a widely applied probabilistic model checker for analysis of systems, to enable it to support non-probabilistic models further.

PEER REVIEW

- Conference: ICDE 2018, UCC 2018, BDCAT 2018, ICDCS 2019
- Journal: TKDE

OPEN-SOURCE PROJECT

- LRBench: A semi-automatic learning rate tuning tool to improve the deep neural network training efficiency as well as its accuracy. (URL: https://github.com/git-disl/LRBench)
- GTDLBench: A performance benchmark of deep learning frameworks to measure and optimize mainstream deep learning frameworks. (URL: https://git-disl.github.io/GTDLBench/)
- Comanche: Accelerating deep learning with Direct-to-GPU storage with a modified Caffe and DeepBench. (URL: https://github.com/IBM/comanche)
- CCAligner: A token based code clone detector for detecting large-gap copy-and-paste source codes. (URL: https://github.com/PCWcn/CCAligner)
- PRISM: Design and implement the LTS and Game model checker for PRISM, a widely applied model checker for system analysis. (URL: http://www.prismmodelchecker.org/)

SKILL

- Programming Skills: C, C++, Python, JavaScript, Java, Go, R, OpenMP, MPI, CUDA, SQL
- Machine Learning: TensorFlow, Caffe, PyTorch, Torch, MXNet, Scikit-learn, Numpy
- Computer Vision: Image Classification, Video Detection, Object Detection, OpenCV
- Big Data Analytics: Hadoop, Spark
- OS Development: Proficient with Linux and mobile OS development
- Useful Tools: Eclipse, Jupyter Notebook, Matlab, LLVM, Git, Subversion, PRISM, LaTeX