Yanzhao Wu

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EDUCATION

Georgia Institute of Technology, Atlanta, Georgia, USA

- Ph.D. student in Computer Science — Aug 2017 – May 2022 (expected)
  - Area: **Systems** & **Machine Learning**
  - Focus: Big Data, Deep Learning, Edge AI
  - Cumulative GPA: 3.92 / 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

RESEARCH EXPERIENCE

High-performance Object Detection on Edge Devices

- Distributed Data Intensive Systems Lab, Georgia Tech — Aug 2020 – Present
  - Supervisor: Prof. Ling Liu
  - Focus: Deep Learning, **Edge AI**
  - Goal: Design and implement an efficient framework for supporting various object detection models and achieving high performance on multiple edge devices.

Pipeline Parallelism for Deep Learning Recommendation Models

- AI System SW/HW Co-Design Team, **Facebook** — May 2020 – Aug 2020
  - Mentor: Dheevatsa Mudigere
  - Focus: Deep Learning, **Pipeline Parallelism**
  - Goal: Apply pipeline parallelism into Facebook deep learning recommendation models to accelerate distributed recommendation model training.
  - Achievement: **PipeDLRM**: an open-sourced software package built on top of DLRM and PyTorch.

High Accuracy and Robust Ensemble of Deep Neural Networks

- Distributed Data Intensive Systems Lab, Georgia Tech — Aug 2019 – May 2020
  - Supervisor: Prof. Ling Liu
  - Focus: Deep Learning, Ensemble Learning
  - Goal: Design and implement an ensemble framework for improving deep neural network accuracy and optimizing inference robustness.
  - Achievement: **EnsembleBench**: a holistic framework for promoting high diversity ensemble learning.

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.

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

- Distributed Data Intensive Systems Lab, Georgia Tech — Aug 2018 – May 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**; One paper published in BigData'19 and one paper under submission.

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.

Experimental Analysis and Optimization of Deep Learning Frameworks

- Distributed Data Intensive Systems Lab, Georgia Tech — Aug 2017 – May 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.

PUBLICATION

- **Yanzhao Wu**, Ling Liu, Zhongwei Xie, Juhyun Bae, Ka-Ho Chow, Wenqi Wei. "Promoting High Diversity Ensemble Learning with EnsembleBench" (IEEE CogMI 2020)
- Zhongwei Xie, Ling Liu, **Yanzhao Wu**, Lin Li, Luo Zhong. "Cross-Modal Joint Embedding with Diverse Semantics" (IEEE CogMI 2020)
- Semih Sahin, Ling Liu, Wenqi Cao, Qi Zhang, Juhyun Bae, **Yanzhao Wu**. "Memory Abstraction and Optimization for Distributed Executors" (IEEE CIC 2020)
- Wenqi Wei, Ling Liu, Margaret Loper, Ka-Ho Chow, Mehmet Emre Gursoy, Stacey Truex, **Yanzhao Wu**. "Adversarial Deception in Deep Learning: Analysis and Mitigation"" (IEEE TPS-ISA 2020)
- Ka-Ho Chow, Ling Liu, Margaret Loper, Juhyun Bae, Mehmet Emre Gursoy, Stacey Truex, Wenqi Wei, **Yanzhao Wu**. "Adversarial Objectness Gradient Attacks in Real-time Object Detection Systems" (IEEE TPS-ISA 2020)
- Juhyun Bae, Gong Su, Arun Iyengar, **Yanzhao Wu** and Ling Liu. "Efficient Orchestration of Host and Remote Shared Memory for Memory Intensive Workloads." (MemSys '20)
- Ka-Ho Chow, Ling Liu, Emre Gursoy, Stacey Truex, Wenqi Wei and **Yanzhao Wu**, "Understanding Object Detection Through An Adversarial Lens." (ESORICS 2020)
- Wenqi Wei, Ling Liu, Margaret Loper, Ka Ho Chow, Mehmet Emre Gursoy, Stacey Truex and **Yanzhao Wu**, "A Framework for Evaluating Client Privacy Leakages in Federated Learning." (ESORICS 2020)
- Wenqi Wei, Ling Liu, Margaret Loper, Ka Ho Chow, Emre Gursoy, Stacey Truex, **Yanzhao Wu**. "Cross-layer Strategic Ensemble Defense against Adversarial Examples." (IEEE ICNC 2020)
- **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." (IEEE BigData 2019)
- Ka-Ho Chow, Wenqi Wei, **Yanzhao Wu**, Ling Liu. "Denoising and Verification Cross-Layer Ensemble Against Black-box Adversarial Attacks." (IEEE BigData 2019)
- 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" (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" (IEEE TSC)
- Ling Liu, Wenqi Cao, Semih Sahin, Qi Zhang, Juhyun Bae, **Yanzhao Wu**. "Memory Disaggregation: Research Problems and Opportunities" (ICDCS'19)
- **Yanzhao Wu**, Wenqi Cao, Semih Sahin, and Ling Liu. "Experimental Characterizations and Analysis of Deep Learning Frameworks" (IEEE BigData 2018)
- Ling Liu, **Yanzhao Wu**, Wenqi Wei, Wenqi Cao, Semih Sahin, and Qi Zhang. "Benchmarking Deep Learning Frameworks: Design Considerations, Metrics and Beyond." (ICDCS'18)
- Pengcheng Wang, Jeffrey Svajlenko, **Yanzhao Wu**, Yun Xu and Chanchal K. Roy. "CCAligner: a token based large-gap clone detector" (ICSE'18)

OPEN-SOURCE PROJECT

- PipeDLRM: Using pipeline parallelism for training deep learning recommendation models. (URL: https://github.com/facebookresearch/dlrm/tree/pipedlrm)
- EnsembleBench: A set of tools for building good ensemble model teams for machine learning and deep learning models. (URL: https://github.com/git-disl/EnsembleBench)
- 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)

SKILL

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