Zhenning Yang

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Education

University of Michigan *08/2022 – 05/2024 (expected)*

MASTER'S OF SCIENCE IN COMPUTER SCIENCE - **GPA**: **4.0/4.0**

University of Tennessee *08/2018 – 05/2022*

BACHELOR OF SCIENCE IN COMPUTER SCIENCE; MINOR IN MATHEMATICS - **GPA**: **3.99/4.0**

Publications

Oobleck: Resilient Distributed Training for Large Models.

Insu Jang, **Zhenning Yang**, Zhen Zhang, Xin Jin, Mosharaf Chowdhury.

ACM Symposium on Operating Systems Principles (SOSP), 2023

SmarCyPad: A Smart Seat Pad for Cycling Fitness Tracking Leveraging Low-cost Conductive Fabric Sensors.

Yi Wu, Luis González, **Zhenning Yang**, Gregory Croisdale, Çağdaş KARATAŞ, Jian Liu.

ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), 2023

A Fast Neural Network-Based Approach for Joint Mid-IR and Far-IR Surface Spectral Emissivity Retrieval.

Zhenning Yang, Xiuhong Chen, Xianglei Huang, Tristan L'Ecuyer, Brian Drouin.

IEEE International Geoscience and Remote Sensing Symposium (IGARSS), 2023

Chasing Low-carbon Electricity for Practical and Sustainable DNN Training.

Zhenning Yang, Luoxi Meng, Jae-Won Chung, Mosharaf Chowdhury.

ICLR workshop: Tackling Climate Change with Machine Learning, 2023

Manuscripts

SLRNet: Semi-Supervised Semantic Segmentation Via Label Reuse for Human Decomposition Images.

Sara Mousavi, **Zhenning Yang**, Kelley Cross, Dawnie Steadman, Audris Mockus.

arXiv preprint, 2022

Pseudo Pixel-level Labeling for Images with Evolving Content.

Sara Mousavi, **Zhenning Yang**, Kelley Cross, Dawnie Steadman, Audris Mockus.

arXiv preprint, 2022

Research Experience

Huang Research Group, University of Michigan *10/2022 – Present*

GRADUATE RESEARCH ASSISTANT, ADVISED BY PROF. XIANGLEI HUANG

- **ML4Remote-sensing** Developed NN models for fast emissivity retrieval, analyzed the model noise-robustness and assessed feature importance using Shapley values.
- Integrate the retrieval solution into the production pipeline for an upcoming satellite mission (ongoing).

SymbioticLab, University of Michigan *10/2022 – 06/2023*

GRADUATE RESEARCH ASSISTANT, ADVISED BY PROF. MOSHARAF CHOWDHURY

- **Fault-tolerant Distributed Training** Optimized the fast failure recovery and high throughput rate of a hybrid-parallel training framework for large DNN models.
- Conducted in-depth analysis of current fault-tolerant distributed training solutions and discovered a key challenge in simultaneously achieving rapid failure recovery and maintaining high throughput.
- Spearheaded experiments evaluating our systems against other solutions under various scenarios, including controlled failures and realistic spot instance traces.
- Streamlined simulation code, wrote comprehensive documentation for replicating research findings, and generated key evaluation metrics like throughput and time occupation breakdown.
- **Carbon-aware DNN Training** Originated a carbon-aware DNN training framework that reduces the carbon footprint of DNN training while maintaining high throughput.
- Identified missing opportunities to leverage cleaner energy sources and to focus on carbon intensity in current energy-aware DNN training solutions.
- Proposed a carbon-aware DNN training solution that forecasts carbon intensity and finds the optimal GPU configuration in real-time, minimizing the carbon footprint of DNN training without relocating or postponing tasks. Won the 2nd Best Overall Solution in Carbon Hack 22.
- Implemented the framework, designed and executed the experiments, analyzed the results, and authored the workshop paper.

Mockus's Research Group and Forensic Anthropology Center, University of Tennessee *08/2020 – 05/2022*

UNDERGRADUATE RESEARCH ASSISTANT, ADVISED BY PROF. AUDRIS MOCKUS

- **ML4Forensic-medicine** Engineered ML models and annotation tools to assist forensic researchers in analyzing human body decomposition.
- Proposed a semi-supervised learning technique for training semantic segmentation models that accurately propagates annotation masks to similar but unlabeled images.
- Improved learning efficacy using a body-alignment algorithm that standardizes the images by re-positioning a body in an image and cropping out the background.
- Devised regression models to predict the Post Mortem Interval (PMI) from decomposition imagery.
- Designed and developed a cloud-based image annotation platform for forensic researchers to efficiently manage and annotate image data.

CURENT, University of Tennessee *05/2019 – 08/2020*

UNDERGRADUATE RESEARCH ASSISTANT, ADVISED BY PROF. AUDRIS MOCKUS AND DR. CHIEN-FEI CHEN

- **ML4Social-media-analysis** Employed natural language processing techniques to analyzed the real-time responses of residents before, during, and after natural disasters through tweets.
- Built DNN models to perform tweet classification and utilized active learning for iterative performance enhancement.
- Programmed Python toolkits for streamlined data scraping, cleaning, and preprocessing, which significantly enhanced automation efficiency.
- Invited to give poster presentation at the 2020 NSF/DOE CURENT engineering research center, Site Visit, and Industry Conference Virtual, Nov. 2020.

Teaching Experience

REU Student Mentor *University of Tennessee*
Research Experiences for Undergraduates (REU) Program *Summer 2020*

Teaching Assistant *University of Tennessee*
Finite Mathematics (Math 123) *Summer 2019*

Math Tutor *University of Tennessee*
Pre-calculus, Calculus, Differential Equation, Abstract Mathematics *09/2018 – 06/2019*

Projects (Selected)

Energy-Efficient ML Compiler, University of Michigan *01/2023 – 05/2023*

TEAM LEAD, ADVISED BY PROF. SCOTT MAHLKE

- Enhanced the TVM autotuner with an energy efficiency feature, focusing on optimizing GFlops/Watt during the autotuning phase of the compilation.
- Observed the benefits of complex operations for power optimization and the paradox that some operator implementations can consume more energy despite being faster.

EcoCAR Mobility Challenge, University of Tennessee *08/2021 – 05/2022*

TEAM LEAD, ADVISED BY PROF. HAIRONG QI AND PROF. DAVID IRICK

- Enhanced the radar-camera fusion architecture for UT's hybrid electric vehicle, decreasing radar 'Ghost Targets' and boosting mAP by 15%.
- Generated a 2-step solution for efficient adaptive cruise control (ACC) systems: first an agent mimics the PID controller through imitation policy, then fine-tuned in an RL setting to optimize fuel economy and energy consumption.
- Presented the UT EcoCAR CAVs system at the Year-4 EcoCAR Mobility Challenge in Phoenix, Arizona.

Skills

Programming C/C++, Python, Wolfram Language, Linux, Bash, LaTeX.
Frameworks PyTorch, TensorFlow, Pandas, NumPy, Matplotlib, Jupyter, Docker, Git, Anaconda.
Languages English, Mandarin, Cantonese.

Honors and Awards (Selected)

2023	**Dean's List all semesters,** UMich
2022	**2nd Best Solution,** Carbon Hack '22
2022	**Dean's List all semesters,** UT
2020	**Christopher J. and Michelle R. Gentry Scholarships,** UT
2020	**Leonard and Betty Shealy Scholarships,** UT
2020	**Exemplary Research Award,** CURENT, UT
2018	**International Undergraduate Merit Scholarships,** UT