ZHENYU LIU

lzy001225@outlook.com

Chengdu, China (+86)187-9055-6355 WeChat:18790556355

Web: https://epsilondom.github.io/

EDUCATION

University of Electronic Science and Technology of China *9/2019- 06/2023(Expected)*

Bachelor Degree of Engineering in Software Engineering (Elite Program)

- **Overall GPA: 3.93/4.0**
- **Average Score: 90/100**

Core Courses:
Cloud Computing (96/100)
Artificial Intelligence (93/100)
Principles of Computer Organization and Architecture (93/100)
Computer Operating System and Practice (92/100)
Big Data Analysis and Intelligence Computing (91/100)
Compiling Technique (90/100)
Probability and Mathematical Statistics (90/100)

RESEARCH INTERESTS

- Tiny Machine Learning, Neural Network Compression, Federated Learning, Distributed Machine Learning

PUBLICATIONS

Wei Jiang, Chen Bian, Jinyu Zhan, **Zhenyu Liu**, Hong Lei, Ziwei Song and Xiangyu Wen, "Self-Organizing and Parallel-Process Driven Fast Generation of Adversarial Examples for 3D Point Clouds", Design Automation Conference 2022 - Poster

Wei Jiang, Chen Bian, Jinyu Zhan, **Zhenyu Liu**, Hong Lei, Ziwei Song and Xiangyu Wen, "Fast Generation of 3D Adversarial Examples to Resist Malicious Deep Learning Incurred Privacy Disclosure in AIoT", IEEE Internet of Things Journal - Under Review

RESEARCH

Communication Efficient Federated Learning System *11/2022 - Now*

Research Assistant, Advisor: Song Guo, Professor, PEILab, HKPolyU

- Trying to develop a communication-efficient federated learning system by using compression methods like parameter quantization, low-rank, or knowledge distillation. Many problems still need to be solved:
- Existing compression methods have poor generalization performance in federal learning scenarios, such as the traditional low-rank method, where the low-rank matrix expresses very limited information and cannot achieve high accuracy in the local model.
- Many methods are post-training compression, what we need to design is a compression algorithm in training.

Self-Organizing and Parallel-Process Driven Fast Generation of Adversarial Examples for 3D Point Clouds

08/ 2021 - 02/ 2022

Research Assistant, Advisor: Wei Jiang, Associate Professor, MobileAI Lab, UESTC

- Designed, prototyped, and experimentally validated a novel data-driven method to fast generate adversarial examples on 3D point deep learnings:
- Designed based on self-organizing map (SOM) a global feature extraction network to process point clouds input with group coding, with a focus on accelerating the coding process and reducing the resource consumption.
- Developed a dual-process point cloud restoration network to generate point clouds with adversarial properties, with a focus on quickly obtaining effective adversarial examples using two parallel branches (a MLP branch and a convolution branch with hybrid loss function) while minimizing resource usage.
- Benchmarked the model performance against those of existing methods, showing
  1) **5x** speed boost
  2) **65%** reduction in GPU resource usage
  3) **12%** increase in the success rate of attacking unseen networks (transferability)
  4) **9.8%** enhancement in the ability to break through point cloud networks with defensive policies
- A research paper to be presented at the **2022 Design Automation Conference**

PROJECTS

▸ Quantization and Efficient Deployment of Neural Networks on Microcontrollers *6/2021 - Now*

Research Assistant, Advisor: Jinyu Zhan, Associate Professor, MobileAI Lab, UESTC

- A Project of National Natural Science Foundation, University of Electronic Science and Technology of China cooperates with Zhejiang University:
- Designed, prototyped, and experimentally validated an electromagnetic stealth algorithm.
- Developed a scheme for quantization and efficient deployment of neural networks on microcontrollers, with a focus on reducing power consumption, relaxing memory and real-time constraints, and facilitating edge deployment.
- Completed a comprehensive literature review on the state-of-the-art technology in embedding artificial intelligence onto low-power devices for speech recognition, object detection, and human activity recognition and validated some useful methods such as Binary Neural Networks, XNOR-Net, BinaryConnect.
- Proposed a new process for FPGA's end-to-end training, quantization, and deployment of neural networks as an alternative to existing inference engines.
- Designed pipelining and data parallelism for hardware to improve inference speed.
- Verified the solutions on Xilinx's Zynq UltraScale+ MPSoC ZCU102 board and deployed a neural network for analyzing radar echoes on ZED-7020 with limited computing resources
- Finally reduced both the energy consumption and the circuit areas significantly without affecting the performance.

▸ Edge real-time monitoring system for drivers' illegal driving actions *5/2021 – 8/2021*

Advisor: Yong Liao, Professor, UESTC

- Designed and prototyped an integrated computer vision system for detecting drivers in the driver's cab who are tired driving, smoking, talking on the phone and other irregular driving behavior:
- In software, designed novel and efficient fatigue feature recognition algorithm based on facial feature point recognition. For phone calls and smoking behavior, integrated the mainstream target detection algorithm yolo-tiny and pose recognition Openpose, and improved them to run smoothly on edge devices.
- In hardware, chose to deploy to the Jetson Xavier, which was successfully deployed and recognized with high accuracy.
- Finally, we won **the Second Prize in the National Computer Design Competition.**

▸ An App Based on Android, focusing on campus errands (Course Project) *1/2021 – 4/2021*

Advisor: Tian Lan, Professor, UESTC

- Developed an App named "UESTC Bang" for students in our school. Since our school is divided into two campuses, this software is designed to provide errand running services for both campuses:
- Those who need it can post tasks from the software and provide payment, and all students can download the software and receive payment for the tasks.
- Designed with a clean user interface and an efficient front-end loading method.
- This project is based on Java, Android Studio. And I am responsible for the front-end design and Software Iteration Timing.

AWARDS&HONORS（SELECTED）

Scholarship

- Outstanding Student Scholarship in 2019-2020. *09/2020*
- Outstanding Student Scholarship in 2020-2021. *09/2021*

Competition

- China Computer Design Competition, Second Prize. *07/2021*
- Sichuan College Students' 'Internet+' Innovation Competition, Golden Prize. *09/2021*

TECHNICAL SKILLS

Programming:	Python, C/C++, Java, Verilog, CUDA, MATLAB
Deep Learning Framework:	Pytorch, Tensorflow
Deep Learning Deployment Tools:	Tensorflow Lite, TVM
Script Tools/Text Editor/Management Tools:	Shell, vim, git, LaTeX
Language:	Mandarin (Native), English (IELTS:6.5)