YUE ZHANG

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Education

University of Hong Kong, Hong Kong, China 09/2022 -- Present
M.Phil. in Electrical and Electronic Engineering *Hong Kong, China*
Fudan University, Shanghai, China 09/2017 -- 06/2021
B.S. in Electrical and Electronic Engineering *Shanghai, China*

Research Interests

My research interests lie in high-performance and energy-efficient hardware for machine-learning and optimization problems, including neuromorphic/in-memory hardware, convex optimization, generative AI and vision language models. My research has been published or accepted in journals and conferences such as Science Advances, Design Automation Conference (DAC) and others.

Research Experiences

Machine learning on RRAM based in memory hardware
Proposed a hardware-software co-design approach that utilizes a dynamic neural network based on semantic memory, implemented using resistive memories. The network and semantic memory are implemented using noise-robust ternary memristor-based Computing-In-Memory (CIM) and Content-Addressable Memory (CAM) circuits. We validated our co-designs through experiments with a 40nm memristor macro.

Nonlinear programming for constrained optimization
Designed circuits with PCB/FPGA simulation to solve nonlinear constrained optimal problems. Validating the hardware for application on portfolio optimization, process synthesis and design problems.

Accelerating content generation model with RRAM-based hardware
Developed an algorithm that accelerates content generation by solving the optimal transport problem to minimize the Wasserstein distance. Designed high-efficient and low-power RRAM based hardware to support the model.

Diffusion model for optimal problems
Investigating the relationship of Markov chain Monte Carlo (MCMC) and diffusion model to accelerate generation.

Publication

[1] **Yue Zhang**, Woyu Zhang, Shaocong Wang, Ning Lin, Hao Jiang, Peng Lin, Xiaoxin Xu, Xiaojuan Qi, Zhongrui Wang, Xumeng Zhang, Dashan Shang, Qi Liu, Kwang-Ting Cheng, and Ming Liu. “Dynamic neural network with memristive CIM and CAM for 2D and 3D vision”, ***Science Advances***, Accepted in press. [PDF]

[2] Ning Lin, Shaocong Wang, **Yue Zhang**, Yangu He, Kwunhang Wong, Arindam Basu, Dashan Shang, Xiaoming Chen and Zhongrui Wang. “Older and Wiser: The Marriage of Device Aging and Intellectual Property Protection of DNNs”, ***2024 Design Automation Conference (DAC’2024)***. [PDF]

[3] Honglei Zhou, **Yue Zhang**, Ye Qiu, Huaping Wu, Weiyang Qin, Yabin Liao, Qingmin Yu, Huanyu Cheng. “Stretchable piezoelectric energy harvesters and self-powered sensors for wearable and implantable devices”, ***Biosensors and Bioelectronics***, 2020, 168(112569). [PDF]

[4] **Yue Zhang**, Zhongrui Wang, etc. “Dynamic Graph Convolutional Network using In-Memory Computing for Graph Convolution and In-Memory Search for Dynamic Gating”, Submitted.

Skills & Tools

Programming Language: Python, C, C++, Verilog HDL, Assembly Language
Software Tool: Candence, LTspice, Vivado, Matlab
Standard Test: TOEFL iBT: 101, GRE: 332