(TRIS) JIAYI TIAN

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EDUCATION

Nanjing University **Nanjing, China**
School of Electronic Science and Engineering Sept. 2019- Jul. 2023

- B.Eng., Major in VLSI Design & System Integration
- **Cumulative GPA: 4.51/5.0; Major GPA: 4.49/5.0 (Top 10% in the grade)**

PREPRINTS

- **Jiayi Tian**, Chao Fang, Haonan Wang and Zhongfeng Wang. "BEBERT: Efficient and robust binary ensemble BERT." *IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP). 2023* [submitted]

RESEARCH EXPERIENCE

Low-bit Quantization Work of BERT in the NLP Area Apr. 2021- Oct. 2022
Independent project, ICAIS Lab, Nanjing University.

- Investigated literature on Transformer-based models and various model compression methods.
- Used Python and Pytorch to perform low-bit quantization with ensemble methods in BERT models.
- Proposed Binary Ensemble BERT (BEBERT), a novel compression scheme to boost the efficiency and robustness of binary BERT. Our BEBERT outperforms the existing binary models by **2%~4%** in accuracy, reducing variance by around **60%**, and achieves **2x** acceleration in the training process.
- Participated in manuscripts reviewing work for TCAS-II.

INT8 Quantization Work of BERT with Hardware Deployment Sept. 2021- Apr. 2023
Member, ICAIS Lab, Nanjing University.

- Used Python and Pytorch to perform INT8 quantization in BERT models.
- Used Matlab to achieve critical operations (Attention, Softmax. etc.) for further hardware coding.
- Planning to use Verilog to deploy INT8 BERT in FPGA for text classification.

Optimization for phase solution in lensless system Sept. 2022- Mar. 2023
Independent project, Vision Lab, Nanjing University.

- Used Python and Pytorch to improve the accuracy of neural networks solving equations.
- Optimized the forward propagation process by providing additional equations.
- Planning to optimize the parameter gradient and objective functions in the backward propagation process to deal with the double solution problem during image reconstruction.
- Planning to optimize phase solution in the diffractive neural field for lensless imaging using the methods above.

Binary Quantization of Transformer-based models with Hardware Deployment Nov. 2022- June. 2023
Member, ICAIS Lab, Nanjing University.

- Investigated literature on state-of-the-art binarization neural networks.
- Planning to use Python and Pytorch to perform full binarization in BERT and ViT with accuracy improvement.
- Planning to use Matlab to achieve important operations in binary BERTs for further hardware coding.
- Planning to use Verilog to devise binary BERT operations in FPGA for efficient inference.

COURSE PROJECTS

Verilog Design Experiment Mar. 2021- Jun. 2021
Member, A+

- Used Quartus and Intel Cyclone5 Series' FPGA to complete a VGA display clock on the monitor.
- Used RAM and temporal logic analysis for VGA to design the hands of the VGA clock.
- Wrote a report in 17 pages by Latex and got an A+ score.

VLSI Design Experiment Mar. 2022- Jun. 2022
Individual assignment, A (top 5%)

- Used Vivado and Cadence to devise efficient coding for computing one-dimension convolution.
- Proposed three optimization methods based on basic VLSI techniques, including pipeline, parallel, and transpose.
- Wrote a report in 11 pages by Latex and got an A score (top 5%).

TECHNICAL SKILLS

- Programming and HDL:
  Advanced in C/Matlab, Proficient in Verilog, Python/Pytorch, Familiar with C++
- Hardware design and simulation skills:
  Advanced in Vivado/Quartus/Modelsim, Altium Designer, and Multisim, Familiar with SPICE
- Languages: TOEFL 102; GRE V153+Q170+3.5

HONORS AND AWARDS

- National Undergraduate Electronic Design Contest, The 2nd Prize in Jiangsu Province, Nov. 2021 (30%)
- National Undergraduate Electronic Design Contest, The 2nd Prize in Jiangsu Province, Oct. 2020 (30%)
- People's Scholarship, The 2nd Prize in NJU, Nov. 2020 (10%)
- Jinxiao Company Scholarship, Nov. 2021 (5%)
- People's Scholarship, The Academic Competition Award, Nov. 2021 (5%)
- Excellent Organization Award, Student Union in Sch of Elec Sci and Eng., NJU, Sept. 2020 (20%)
- Excellent Department Director, Student Union in Sch of Elec Sci and Eng., NJU, Oct. 2021 (15%)
- Excellent Volunteer Prize, NJU, Dec. 2021 (<1%)
- Excellent Volunteer Prize on the school's 120th anniversary, Sept. 2022 (<1%)

EXTRA-CURRICULAR EXPERIENCE

Department Director Sept. 2020- Sept. 2021

Organization Department, Student Union in Sch of Elec Sci and Eng.

- Organized school social practice, volunteer work, and extracurricular activities.

Vice-chairman Sept. 2021-Sept. 2022

School Badminton Association, Nanjing University.

- Organized large-scale sports events and contests in NJU; the number of participants is up to hundreds.

Captain Sept.2021-Sept. 2022

Women's Volleyball Team, Sch of Elec Sci and Eng.

- Won the 4th prize in the 2019-2020 departmental contest and the 3rd prize in the 2020-2021 departmental contest.