Jiaqi Shao

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Federated/Distributed Learning, Distributed System, AI IoT

Education

The Hong Kong University of Science and Technology Expected Sep 2023 - Aug 2027
PhD in Electronic and Computer Engineering (Federated Learning, Efficient Distributed Systems)

The Chinese University of Hong Kong, Shenzhen 2019 — 2023
Bachelor of Engineering in Electrical and Computer Engineer, *Stream*: **Computer Engineering**
GPA: 3.75/4.00 (top **10%** in the school)

Research / Internship Experience

FedCampus Platform **May 2023 — Present**
[1] *Research Assistant in Division of Natural and Applied Sciences, Duke Kunshan University*

- Conducted private-preserving analysis on sensitive health data with differential privacy.
- Developed a persistent and robust federated learning protocol for cost-efficient cross-device training using Python and TensorFlow Lite.

Differential Private Federated Analytics **May 2022 — Fed 2023**
[2] *Research Assistant in Shenzhen Institute of Artificial Intelligence and Robotics for Society (AIRS)*

- Developed a federated analytics protocol applying on cross-device settings with differential privacy protocol using Python, PyTorch.
- Researched on differential privacy with histogram estimation and heterogeneous data using various algorithms and methods.

FedEdge Platform – A Federated Learning Platform **December 2021 — May 2022**
Research Assistant in Network Communication and Economics Laboratory (NCEL) *Shenzhen, China*

- Developed a cross-device federated learning platform for research experiments using *Python*, *Java*, and *C++*.
- Managed heterogeneous devices by programming on Android mobiles with *Java*, IoT devices with *C++*, and the server with *Python*
- Evaluated the performance and scalability of the platform on various datasets and scenarios.

Yonyou HK **June 2021 — September 2021**
Assistant RD Engineer/HK RD Team *Shenzhen, China*

- Developed user-friendly front-end web applications using *JavaScript* and *React* framework.
- Improved users' experience quality and network congestion with front-end caching strategies using Service Worker API.

Honors / Awards

Dean's List Award (Awarded to top **20%** in the school) 2019 — 2020, 2021, 2022
Academic Performance Scholarship (Awarded to top **10** % in the school) 2021 — 2022
Undergraduate Research Awards April 2022
— Awarded to undergraduate students dedicated to a self-proposed research program.
Bowen Scholarship (30,000 RMB per year) 2019 — 2020, 2021, 2022
The 2^{nd} Prize of ASC Student Supercomputer Challenge March 2021
— Responsible for using C++ to implement distributed computation to achieve computational speedup.
The 2^{nd} Prize of "Yonyou·Huawei Cloud" 3rd Business Innovative Developer Competition August, 2021
— Responsible for designing the application and leading the development progress to obtain business opportunities.

Course Projects

Distributed and Parallel Computation Course

- Implemented distributed and parallel computing tasks, such as odd-even sort, NBody simulation, and heat simulation, by different parallelizing techniques like MPI, OpenMP, and CUDA.
- Analyzed and optimized experiment results considering computation bottleneck and communication overhead.

Operating System Course

- Modified the loadable kernel module to execute system calls for user process execution using *C*.
- Simulated virtual memory through implementing the invert page table to transfer virtual address with physical address, and least recent unused (LRU) algorithm to handle page fault/replacement using *C++*.

Computer Architecture Course.

- Implemented the MIPS simulator to simulate the execution of MIPS program, including encoding MIPS instructions into machine code, managing PC counter, and allocating memory space using **C++**.
- Designed the pipelined CPU using Verilog, pipelining datapath with 5 stages, and handling data hazard and control hazard using **Verilog**.

[1] Patent: B. Luo, **J. Shao**, J. Huang, Method and Apparatus for Frequent Items Mining Using Federated Analytics, CN202310365167.7, Mar. 2023, field
[2] Patent: B. Luo, **J. Shao**, J. Huang, Method and Apparatus for Frequent Data Mining Based on Hierarchical Federated Analytics, CN202310330791.3, Mar. 2023, field