Zikun Li

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EDUCATION

School of Electronic Engineering and Computer Science, Peking University (PKU) Beijing, China
Bachelor of Science in Computer Science and Technology Sep 2017 - July 2021

- **Thesis:** A Survey of Data Processing Unit (DPU) and A Preliminary Programming Framework Design
- **Awards:** The Third Prize Scholarship (2020); Model Student of Academic Record (2020)
- **Relevant Coursework:** Programming in C&C++, Data Structure and Algorithm, Introduction to Computer Systems, Operating Systems, Algorithm Design and Analysis, Computer Architectures, Computer Networks, Introduction to Database Systems, Computation, Mathematics and Statistics for Visual Search Applications
- **English Skill:** TOEFL 107; GRE 333+4.0

PUBLICATIONS

- Jizhou Li*, **Zikun Li***, Yifei Xu*, Shiqi Jiang, Tong Yang, Bin Cui, Yafei Dai, and Gong Zhang. 2020. **WavingSketch: An Unbiased and Generic Sketch for Finding Top-k Items in Data Streams**. In Proceedings of the 26th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (**KDD '20**). Association for Computing Machinery, New York, NY, USA, 1574–1584. DOI:https://doi.org/10.1145/3394486.3403208 (* indicates equal contribution)

- Zheng Zhong*, Shen Yan*, **Zikun Li***, Decheng Tan, Tong Yang, and Bin Cui. 2021. **BurstSketch: Finding Bursts in Data Streams.** In Proceedings of the 2021 International Conference on Management of Data (**SIGMOD/PODS '21**). Association for Computing Machinery, New York, NY, USA, 2375–2383. DOI:https://doi.org/10.1145/3448016.3452775 (* indicates equal contribution)

RESEARCH EXPERIENCES

A Quantum Program Super-Optimizer PA, USA
Research Assistant, Carnegie Mellon University, Advisor: Dr. Zhihao Jia Sep 2021 – Present

- Participated in the design of a optimizer for quantum compiler, focused on applying optimization rules on quantum circuits
- Implemented the DAG data structure that represents quantum circuits and functions that enables optimizations to be applied
- Added heuristics in applying optimizations, accelerated the process it takes to reach an near-optimal result
- Conducted experiments and reported feedbacks that help improve multiple parts of our approach

A Sketch-Based Burst Detection Algorithm in High-Speed Data Streams Beijing, China
Research Assistant, Peking University, Advisor: Dr. Tong Yang Mar 2020 – Nov 2020

- Participated in the design of a data structure which supports real-time detection of bursts in high-speed data streams
- Proposed a sketch-based algorithm that is both memory-efficient, fast, and accurate
- Drafted and submitted a paper to SIGMOD 2021 as one of the co-first authors

An Unbiased and Generic Data Structure for Finding Top-K Items in Data Streams Beijing, China
Research Assistant, Peking University, Advisor: Dr. Tong Yang June 2019 - Feb 2020

- Participated in a study on devising a data structure called WavingSketch which can provide unbiased and accurate estimations for items' frequencies in a data stream and published the paper in SIGKDD 2020 as the co-first author
- Proposed the sketch to handle four typical tasks in data stream processing: finding frequent items, finding heavy changes, finding persistent items, and finding Super-Spreaders
- Made the experiment design and implemented different versions of algorithms in C++
- Setup the benchmark platform to confirm datasets, algorithms of related work, measures, and re-sampling strategies
- Ran benchmark with respect to certain performance measures (average relative error, precision, recall, F1 score, and throughput)

An Automatic SQL-Based Feature Generator for Machine Learning Model BC, Canada
Research Assistant, Simon Fraser University, Advisor: Dr. Jiannan Wang May 2020 - Sep 2020

- Devised an algorithm that automatically generates SQL expressions which selects certain information from data tables for the

machine learning model

- Adopting the idea of transfer learning and hyper-parameter tuning for ML
- Scrutinized and revised Python lib Optuna code and conducted experiments
- Adjusted the algorithm to reduce the parameters users needed to set and enlarge the search space, making the technique capable of achieving better performance with less effort on fine-tuning

PROJECT EXPERIENCES

Using CUDA to Accelerate Hines Algorithm Beijing, China

Project Owner, Peking University May 2020 – July 2020

- Devised a mechanism to utilize GPU to parallelize the Hines algorithm, which is widely used in computational neuroscience
- Applied the divide and conquer idea to divide the computation tree of an algorithm into branches by CPU
- Used GPU to carry out parallel computation on branches with the same depth
- Merged the branch results upon completion in a cascade and lowered the latency by at most 12.4 times

A CNN Accelerator on FPGA Beijing, China

Project Owner, Peking University Sep 2019 – Dec 2019

- Used integrated circuit FPGA to accelerate the inference process of a given CNN network for object detection
- Implemented a CNN accelerator in C++ with Xilinx HLS tools to improve algorithm performance
- Applied the ping-pong buffer concept to increase parallelism and designed to achieve parallelism in the batch dimension, which can process a batch of images simultaneously in a pipeline
- Achieved a throughput of 18Gops (the upper limit of the FPGA is 76Gops)

TECHNICAL SKILLS

Language:	C, C++, Java, Python, SQL, JavaScript
Tools:	Git, Github, Docker, MySQL, SQLite
Frameworks:	Pytorch, Tensorflow, Pandas, Flask, React