

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 - June 2021 (expected)

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, Algorithm Design and Analysis, Computer Architectures, Java Programming, Computation, Mathematics and Statistics for Visual Search Applications, Operating Systems, Web Data Mining, Introduction to Database Systems, and Computer Networks

PUBLICATIONS

- Jizhou Li*, **Zikun Li***, Yifei Xu*, Shiqi Jiang, Tong Yang, Bin Cui, Yafei Dai, and Gong Zhang. “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*, pp. 1574-1584. 2020. (* indicates equal contribution)
- Zheng Zhong*, Shen Yan*, **Zikun Li***, and Tong Yang. “BurstSketch: Finding Bursts in Data Streams.” Submitted to the 2021 ACM SIGMOD International Conference on Management of Data. (* indicates equal contribution)

RESEARCH EXPERIENCES

A Sketch-Based Burst Detection Algorithm in High-Speed Data Streams

Beijing, China

Research Assistant, Peking University, Advisor: Dr. Tong Yang

Mar 2020 – Present

- 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

PKU Ranking

Beijing, China

Team Member, Peking University

April 2020 - Present

- Built a metrics-based ranking website, <http://pkuranking.com/ranking>, which displays professor info, paper citing rate, and research orientation to help students find their interest and seek research opportunities
- Implemented a web crawler with a seed file and politeness policy to periodically fetch and parse data
- Designed and developed backend services to support domain filtering, ranking, and communication with the presentation

layer and persistency layer

- Designed database schema and data models to provide data serving and storage for upstream services

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 Memory Allocator

Beijing, China

Project Owner, Peking University

Sep 2018 – Oct 2018

- Designed and implemented a memory management system like the function *malloc* and *free* in C
- Used a red-black tree to manage large blocks and use ordered lists to organize small blocks
- The program performed well in both memory utilization rate (98%) and throughput and achieved the highest possible score in the online evaluation

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)

An LSTM-Based Question-Answer Matching Model

Beijing, China

Project Owner, Peking University

Nov 2019 – Jan 2020

- Designed an algorithm model based on LSTM for choosing the best answer for a given question from several sentences
- Augmented the original training data to prevent learning irrelevant patterns and boost overall performance
- Implemented in Python using the framework PyTorch and achieved the best performance among non-bert models

The Ataxx Game

Beijing, China

Project Owner, Peking University

Oct 2017 – Jan 2018

- Designed an app for a chess-like game called Ataxx which consists of UI and a game bot
- Implemented functions such as save and undo in C++
- Adopted the min-max algorithm to evaluate each choice on the board, predicted the situation in several steps, and chose the best position on the board that maximizes its own interest and minimizes the adversary's
- Improved the bot to defeat many human players and achieved a rank in the top 15% in the final contest

TECHNICAL SKILLS

Language:	C, C++, Java, Python, SQL, Javascript
Tools:	Oracle, Git, Github, Docker, Nginx, MySQL, Redis
Frameworks:	Numpy, Pandas, PyTorch, TensorFlow