Kai Shen

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EDUCATION

University of Toronto September 2022 - Present

- *M.A.Sc.* in Department of Electrical and Computer Engineering
- Advisor: Baochun Li

The Chinese University of Hong Kong, Shenzhen May 2022

- *B.Eng* in School of Data Science, with Honours, First Class
- Major in Computer Science and Engineering
- Core Courses: Networks(A), Cloud Computing(A), Software Engineering(A), Programming Paradigms(A), Distributed Computing(A), Operating Systems(A-), Computer Architecture(A-), Optimization(A-)

University of California, Berkeley June 2019 - August 2019

- Summer Program
- Course: Data Structures and Algorithms

RESEARCH INTERESTS

Networking, Multimedia Streaming, Deep Learning, Federated Learning, Optimization

PUBLICATION

- Dayou Zhang, Kai Shen[1], Fangxin Wang, Dan Wang, Jiangchuan Liu. "Towards Joint Loss and Bitrate Adaptation in Realtime Video Streaming," in IEEE ICME, 2022.
- Kai Shen, Dayou Zhang, Zi Zhu, Lei Zhang, Fangxin Wang, Dan Wang. "SJA: Server-driven Joint Adaptation of Loss and Bitrate for Multi-Party Realtime Video Streaming," in IEEE INFOCOM, 2023.
- Kai Shen, Baochun Li. "Learning-based Network Performance Estimators: The Next Frontier for Network Simulation," in IEEE Network, Special Issue on Interplay Between Machine Learning and Networking Systems, July 2023.

Teaching Experience

- CSC148 – Introduction to Computer Science Winter 2023, UofT
- CSC3150 - Operating System Spring 2022, CUHK(SZ)

Professional Services

- IEEE Transactions on Mobile Computing (TMC)
- IEEE Transactions on Network Science and Engineering (TNSE)

HONORS AND AWARDS

- University of Toronto Fellowship, Department of ECE, UofT 2022 - 2024
- Dean's List, School of Data Science, CUHK(SZ) 2019 - 2021
- Academic Performance Scholarship, CUHK(SZ) 2020 - 2021
- Undergraduate Student Research Scholarship, CUHK(SZ) 2020 - 2022
- Bowen's Admission Scholarship, CUHK(SZ) 2018 - 2021

RESEARCH EXPERIENCES

Towards Generalizable and Scalable Network Performance Estimation **UofT**
*The iQua Group, supervised by **Prof. Baochun Li*** 01/2023 - 07/2022

[1]co-first author with equal contribution

- Proposed a novel network performance estimator, CONSTRUCT, which leverages Transformer models for joint prediction of packet delay and drop rates.
- For the first time to exploit deep neural networks to estimate network performance at the port level, significantly enhancing its generality.
- Implemented and open-sourced the network performance estimator.

Deep-neural-network-based Streaming Transmission Optimization **CUHK(SZ)**
Intelligent Networking and Multimedia Laboratory, supervised by ***Prof. Fangxin Wang*** 03/2021 - 08/2022

- Proposed a joint adaptive solution of bitrate and packet loss for real-time transmission based on UDP protocol to maximize Quality of Experience(QoE)
- Implemented a control system by applying Reinforcement Learning algorithm based on current network status
- Implemented a joint framework for packet transmission with minimized latency by trading extra bandwidth or slightly sacrificing video quality.

Printer Control Project **CUHK(SZ)**
AIoT Laboratory, supervised by ***Prof. Yeh-Ching Chung*** 06/2020 - 12/2020

- Developed an integrated printer control system which can process millions of data
- Implemented a multi-threaded LSTM-based OCR component for image processing and text recognition
- Configured a high-performance document retrieval widget with Solr

SELECTED COURSE PROJECT

Computer Architecture
MIPS Simulator 04/2021

- Assembled MIPS assembly language files to generate output files composed of machine code.
- Built a program that simulates the execution of machine codes.

Sofeware Engineering
EasyGo: Travel Planning Application 03/2021

- Developed an Android application for route planning and travel information sharing.
- Designed algorithms for route planning customization to replace tedious procedure of travel planning

Distributed and Parallel Computing
N-body Simulation 12/2020

- Implemented a multi-version program to simulate an astronomical N-body system in two-dimensions.
- Five versions based on different frameworks: sequential version, Pthread version, OpenMP version, MPI version and MPI + OpenMP version.

Cloud Computing
Model and Platform Performance Evaluation on AIRS Cloud 10/2020

- An analytic project about the evaluation of AIRS cloud performance and different algorithm models.
- Compared metrics including throughput, speedup and efficiency of Hadoop and Spark deployed on AIRS Cloud.
- Compared metrics including cost, accuracy, and time of machine learning algorithms deployed on AIRS Cloud.

SKILLS

Computer Skills	**C/C++, Python, SQL, R, MATLAB, Java, JavaScript, Git, Excel**
Languages	**Chinese (Native), English (Fluent, IELTS-7.0)**
Interest	**basketball, badminton, hiking**