

XIAOQIAN (TIFFANY) ZHANG

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OBJECTIVE

Full-Time Tenure-Track Computer Science/Engineering Assistant Professor

RESEARCH INTERESTS

Congestion control in Disaggregated Storage Systems, Edge Computing, Mobile Computing, Big Data Analytics, and Distributed Systems.

EDUCATION

University of Massachusetts, Boston
Ph.D. Candidate, Computer Science, GPA: 4.0

Boston, MA
Jan. 2018–May 2023

New York University
Master of Science, Mathematics, GPA: 3.4

New York, NY
Sep. 2012–May 2014

Skidmore College
Bachelor of Art, Mathematics and Economics, GPA: 3.7

Saratoga Springs, NY
Sep. 2008–May 2012

HIGHLIGHTED EXPERIENCE

- **Research Experience**

5 years of system work research experience

- **Teaching Experience**

1 semester as the teaching assistant

4 years as the undergraduate lecturer

- **Industry Experience**

2 years as the contractor research assistant in the Deep Learning research team of Brookhaven Nation Laboratory

1 summer as the intern research assistant in Air Force Research Laboratory in the base of Eglin, FL

2 years of receiving the GRA-W Grad Cohort Workshop Travel Grants

TEACHING EXPERIENCE

Lecturer

Boston, MA

Introduction to Computer Concepts (CS105) / University of Massachusetts, Boston

Spring 2019–Present

- Instruct this introductory course for 8 semesters starting Spring 2019: both in-person and virtual lectures (during pandemic) with class size of more than 50 students
- Deliver three 50-min lectures weekly, covering topics of overall computer concepts - computer applications, capabilities and limitations
- Design course presentation slides, class exercises, exams, assignments

- Presents an overview of computer concepts - computer applications, capabilities and limitations
- Motivate college students from diverse backgrounds to explore the subject of computer science

Teaching Assistant

Boston, MA

Applied Discrete Mathematics (CS 220) / University of Massachusetts, Boston

Spring 2018

- Assist the instructor to develop, post and grade students' assignments through the Grade Scope modules
- Answer students' questions through the Piazza course portal
- Host in-person Q&A sessions during office hours twice a week

INDUSTRY EXPERIENCE

Brookhaven National Laboratory

Upton, NY

Contractor Research Assistant / Nonproliferation and National Security Department

Jun. 2020–May 2022

- Apply Deep Learning algorithms to conduct object-based identification and motion detection on International Atomic Energy Agency (IAEA) safeguards video surveillance
- Implement YOLOv2, YOLOv3, and Cross-Camera Re-Identification algorithms to train Deep Learning models with IAEA safeguards surveillance camera image datasets to detect target objects
- Tune hyper-parameters for Deep Learning models to optimize prediction results
- Assist team with designing, testing and delivering the YOLOv3 based object detection UI software to IAEA safeguards to automate the process of suspicious objects detection with a 92.3% accuracy

Air Force Research Laboratory

Eglin, FL

Summer Internship Research Assistant / AFRL Eglin Laboratory

Summer 2019

- Detection of Rouge Transmitter in Radio Frequency Machine Learning (RFML) system with the image (graphed transmitter fingerprinting) classification approach
- Assist team with pre-processing the transmitter fingerprinting images: the graphed raw radio frequency I/Q signal data image dataset
- Participate in the design of a Deep Neural Network for multi-class classification for transmitter fingerprinting

PUBLICATIONS

1. Tengpeng Li, **Xiaoqian Zhang**, Nam S Nguyen, Bo Sheng, "CODS: Cloud-assisted Object Detection for Streaming Videos on Edge Devices", *IEEE International Performance, Computing, and Communications Conference (IPCCC)*, October 2021
2. Danlin Jia, Tengpeng Li, **Xiaoqian Zhang**, Li Wang, Mahsa Bayati, Ron Lee, Bo Sheng, Ningfang Mi, "SNIS: Storage-Network Iterative Simulation for Disaggregated Storage Systems", *IEEE International Performance, Computing, and Communications Conference (IPCCC)*, Oct. 2021
3. Tengpeng Li, Nam Son Nguyen, **Xiaoqian Zhang**, Teng Wang, Bo Sheng, "PROMAR: Practical Reference Object-based Multi-user Augmented Reality", *IEEE International Conference on Computer Communications (INFOCOM)*, Jul. 2020
4. Nam Son Nguyen, Tengpeng Li, **Xiaoqian Zhang**, Teng Wang, Jiayin Wang, Bo Sheng, "Audio Noise Filter using Cycle Consistent Adversarial Network-CyclesGAN ANF", *IEEE International Conference on Computer and Communications (ICCC)*, Dec. 2019
5. Tengpeng Li, **Xiaoqian Zhang**, Teng Wang, Nam Son Nguyen, Xiaohui Liang, Bo Sheng, "FARES: Fast and Accurate Recognition of Exact Scenes on Mobile Devices", *IEEE International Conference on Computing, Networking and Communications (ICNC)*, Feb. 2019

6. Teng Wang, Nam Son Nguyen, Jiayin Wang, Tengpeng Li, **Xiaoqian Zhang**, Ningfang Mi, Bin Zhao, Bo Sheng, “ROVER: Robust and Verifiable Erasure Code for Hadoop Distributed File Systems”, *IEEE International Conference on Computer Communication and Networks (ICCCN)*, Jul. 2018
7. Nam Son Nguyen, Teng Wang, Tengpeng Li, **Xiaoqian Zhang**, Bo Sheng, Ningfang Mi, Bin Zhao, “OWLBIT: Orchestrating Wireless Transmissions for Launching Big Data Platforms in an Internet of Things Environment”, *IEEE International Conference on Cloud Computing (CLOUD)*, Jul. 2018

UNDER SUBMISSION

1. **Xiaoqian Zhang**, Bo Sheng, “DIRS: Dynamic Initial Rate Setting in Congestion Control for Disaggregated Storage Systems”, *IEEE International Conference on Computing, Networking and Communications (ICNC)*, Feb. 2023

PROFESSIONAL SERVICES

Reviewer/Sub-reviewer for Journal&Conference Manuscript Submissions

- International Performance Computing and Communications Conference. (IPCCC) 18’, 19’, 20’, 21’
- The IEEE Conference on Computer Communications (INFOCOM) 18’, 19’

Memberships

- UMass Women in Science Community(WINS) member
- IEEE Communications Society student member

SELECTED RESEARCH EXPERIENCE

Congestion Control for Disaggregated Storage Systems

We develop a new solution, DIRS, which dynamically sets the initial sending rate for each flow. Especially under heavy I/O traffic, our scheme helps improve the effectiveness of the congestion control protocols and sets an appropriate initial rate for a flow that can mitigate the congestion from the beginning while not degrading the flow’s network performance, to better resolve network congestion in the disaggregated storage systems. The proposed approaches have been implemented and evaluated in the network simulator NS3 for RDMA (NS3-RDMA).

- Investigate the architecture, core components and source code of the NS3-RDMA simulator.
- Review the literature and source code of existing congestion control schemes and protocols (e.g. PFC, ECN, DCTCP, DCQCN, etc.).
- Design a dynamic initial sending rates assignment algorithm in congestion control to address several issues found in the existing congestion control schemes originally designed for datacenter networks with the objective of reducing network congestion and improving overall network throughput.
- Implement our solutions in C++ and integrate them into the NS3-RDMA simulator.
- Conduct sensitivity analysis on key parameters in networking configuration to optimize simulation results.

SNIS: Storage-Network Iterative Simulation for Disaggregated Storage Systems

We propose a storage-network iterative simulation, SNIS, for disaggregated storage systems. Our work presents an iterative multi-round simulation method for modeling disaggregated storage systems by simulating storage and network activities jointly. Instead of simply linking two existing simulators, SNIS

iteratively updates actual arrival times of storage (resp. network) write (resp. read) requests to achieve convergence in performance. In this way, SNIS can mitigate the impacts of performance interference and request randomization and use the converged results to simulate and evaluate disaggregated storage systems accurately.

- Investigate the source code of both the network simulator NS3-RDMA and the storage simulator MQSim, and perform storage-network simulations by adopting these two simulators.
- Generate the synthetic workloads based on characteristics of public storage traces.
- Conduct evaluation experiments of SNIS by using a variety of synthetic workloads with different request arrival rates and sizes.

TECHNICAL SKILLS

- Deeply understand the architecture and the source code of network simulator such as NS-3
- Four years' experience in Java and Python development, debugging and testing
- Extensive experiences in configuration and deployment of Hadoop and Spark
- Proficient in Deep Learning algorithms, such as TensorFlow, YOLOv2, YOLOv3, Cross-Camera Re-Identification

AWARDS

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| • Travel Grant on GRA-W Grad Cohort Workshop, Virtual | 2020 |
| • Travel Grant on GRA-W Grad Cohort Workshop, Chicago | 2019 |

REFERENCES

- Bo Sheng (Ph.d. Advisor), Associate Professor, Department of Computer Science, University of Massachusetts Boston, E-mail: bo.Sheng@umb.edu, Tel: 617-287-6468
- Ningfang Mi, Associate Professor, Department of Computer Engineering, Northeastern University E-mail: ningfang@ece.neu.edu, Tel: 617-373-3028
- Marc Pomplun, Department Chairman, Department of Computer Science, University of Massachusetts Boston, E-mail: marc.pomplun@umb.edu, Tel: 617-287-6443