Lina Qiu

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EDUCATION

Boston University, Graduate School of Arts and Sciences, Boston, MA 2019 - Now
Doctor of Philosophy, Computer Science

New York University, Tandon School of Engineering, New York, NY 2017 - 2019
Master of Science, Computer Science

The University of Edinburgh, School of Informatics, Edinburgh, UK 2015 - 2017
Bachelor of Engineering with Honors, Computer Science and Electronics

South China University of Technology, School of Electrical and Information Engineering, Guangzhou, China 2013 - 2015
Bachelor of Engineering, Information Engineering

TECHNICAL SKILLS

Programming/Scripting Languages: (Proficient) C++, Java, Python, SQL; (Familiar) Go, Scala, Bash, MATLAB
Frameworks and tools: Git, CMake, Maven, MapReduce, Apache Spark, Hadoop, Lucene, Intel SGX, AMD SEV, EMP-toolkit

RESEARCH EXPERIENCE

"Doquet: Differentially Oblivious Range and Join Queries with Private Data Structures", [Published on VLDB 2023**]**

Supervised by Prof. George Kollios

- Propose novel private data structures and indices. Develop differentially oblivious join and select algorithms based on them. Prove the guarantee of **differential privacy** on **access patterns** and **output size leakages**.
- Run an extensive set of experiments to evaluate the performance of our strategies on the 2nd gen of **Intel SGX**. Empirically show the substantial performance gain (up to an order of magnitude) of our algorithms in comparison with their state-of-the-art counterparts.

"Synopsis Assisted Secure Collaborative Analytics", [Paper **accepted by VLDB 2025]**

- The first Secure Collaborative Analytics (SCA) **MPC** system that simultaneously ensures bounded privacy loss, advanced query planning, and lossless processing.
- Our comprehensive benchmarks demonstrate that SPECIAL outperforms state-of-the-art SCAs, with up to 80X faster query times, 900X smaller memory usage for complex queries, and up to 89X reduced privacy loss in continual processing.

Master Thesis "Scalable Publish Subscribe Systems", [Thesis Link]

Supervised by Prof. Torsten Suel

- Integrate several remarkable Reverse Search algorithms into Luwak (a high-performance stored query engine), test and compare their performance.
- Propose a scalable scheme to optimize the runtime performance of Luwak, while keeping memory usage within an acceptable limit for modern machines. Our scheme can process document notifications 8 to 9 times faster.

"IPTV Channel Zapping Recommendation with Attention Mechanism", [Published on IEEE Transactions on Multimedia**]**

Supervised by Prof. Yong Liu

- A deep neural network model that consists of a "Recommender System Attention (RS Attention)" module and a "Channel Attention" module capturing the static and dynamic user switching behaviors is developed to improve the recommendation accuracy.
- Evaluation on the IPTV dataset demonstrates that our attention neural network model can achieve 45% hit ratio with only three candidate channels, incurring low data and computation overheads.

WORK EXPERIENCE

SWE Intern, Google Summer 2023

- Build a **Python API** for Voxel (a portable and performant **in-memory SQL query engine** kernel), such that Numpy array and Pandas DataFrame can be equivalently converted to/from Voxel data structures. The API facilitates a

natural and intuitive use of SQL in Python.

Research Intern, Cockroach Labs, [Published on DaMoN 2024**].** Summer 2022

- Investigate various system operations to understand the performance overheads of **AMD SEV-supported confidential VMs**. Our findings indicate that memory and I/O-intensive workloads incur significant overhead.
- Study the performance implications of running unmodified database applications, specifically CockroachDB, on confidential VMs by examining OLTP and OLAP workloads. Discuss potential avenues for optimizations, particularly improving cache performance.

PUBLICATIONS

Qiu, L., Kellaris, G., Mamoulis, N., Nissim, K. and Kollios, G., 2023. Doquet: Differentially Oblivious Range and Join Queries with Private Data Structures. Proceedings of the VLDB Endowment, 16(13), pp.4160-4173.

Qiu, L., Taft, R., Shraer, A. and Kollios, G., 2024, June. The Price of Privacy: A Performance Study of Confidential Virtual Machines for Database Systems. In Proceedings of the 20th International Workshop on Data Management on New Hardware (pp. 1-8).

Li, G., **Qiu, L.**, Yu, C., Cao, H., Liu, Y. and Yang, C., 2020. IPTV channel zapping recommendation with attention mechanism. IEEE Transactions on Multimedia, 23, pp.538-549.

Wang, C., **Qiu, L.**, Bater, J. and Luo, Y., 2024. SPECIAL: Synopsis Assisted Secure Collaborative Analytics. arXiv preprint arXiv:2404.18388.