# Jingfan Meng

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## EDUCATION

**Georgia Institute of Technology** Aug. 2019 – May 2025 (Expected)
*PhD Student in Computer Science* Atlanta, GA, USA

- **GPA**: 4.0 / 4.0. **Coursework**: Networking Algorithmics, Linear Optimization, Combinatorial Optimization
- **Research**: Network Switching, Data Streaming, Nearest Neighbor Search, Efficient hashing-based algorithms.

**Shanghai Jiao Tong University** Sept. 2015 – June 2019
*Bachelor Degree in Electronics and Electric Engineering* Shanghai, China

- **GPA**: 4.02 / 4.3, **Ranking**: 2 / 91
- **Coursework**: Data Structures, Algorithms, Databases, Machine Learning
- **Research**: Social Networks, Random Graph Theory, Algorithmic Game Theory

## INTERN EXPERIENCE

**Google LLC** Software Engineering Intern
*Memory-Efficient Aggregation in SQL Query Engine* May 2022 – Aug. 2022

- Design and implement memory partitioning of the aggregation operator in the SQL query engine.
- Split a very large buffer into multiple partitions and dynamically manage these partitions.
- Benchmark the changes and show that partitioning reduces query time, memory usage, and out-of-memory errors.
- **Skills**: C++ Object Oriented Programming, Object Oriented Program Design, Performance Optimization

## SELECTED PROJECTS

**C++ Nearest Neighbor Library Based on FALCONN** Project Leader

- Expand the functionality of FALCONN, an open source C++ library, to multiple target distances. Implement various performance optimizations. Perform approximate nearest neighbor search of billion-scale datasets in seconds.
- **Skills**: C++ Template Metaprogramming, Polymorphism, Performance Optimization

## RESEARCH EXPERIENCE

**1. ONIAK (One Index for all Kernels): A Zero Re-Indexing LSH Solution to ANNS-Mahalanobis.**
***Meng, J.**, Wang, H., Xu, J., Ogihara, M.* Published in VLDB 2023

- Propose ONIAK, the first-ever solution that has zero re-indexing overhead for ANNS-Mahalanobis searching on arbitrarily changing kernels.
- Propose FGoeQF, an efficient simulation procedure that speeds up the computation of LSH values by two orders of magnitude, and that has wide application in many other areas.
- Propose ANNS-ALT (after linear transform), a wide family of ANN searching problems that has many useful applications. Show that ONIAK efficiently solves ANNS-ALT, and hence solves all its applications.
- **Keywords**: Locality-Sensitive Hashing (Order Preserving Mappings), Efficient Generation of Random Variables

**2. RECIPE: Rateless Erasure Codes Induced by Protocol-Based Encoding.**
***Meng, J.**, Liu, Z., Wang, Y., Xu, J.,* Published in ISIT 2023

- Study the problem of designing distributed Luby transform code encoders that have no knowledge of the path length.
- Give a sufficient and necessary condition on the family of Luby transform degree.
- Propose an efficient and easy-to-implement algorithm for constructing any degree distribution in this family.
- Show by simulation that some codes in this family achieve high coding efficiency.
- **Keywords**: Randomized Algorithms, Precomputation and Monte Carlo simulation

**3. On Efficient Range-Summability of IID Random Variables in Two or Higher Dimensions.**
***Meng, J.**, Wang, H., Xu, J., Ogihara, M.* Published in ICDT 2023

**4. A Dyadic Simulation Approach to Efficient Range-Summability.**
***Meng, J.**, Wang, H., Xu, J., Ogihara, M.* Published in ICDT 2022

- Work on the following problem: Generate a very long sequence of random variables in one or more dimensions and efficiently calculate an arbitrary range-sum of them in logarithmic time.
- Develop the first implementation on this problem in one dimension, which generates any range-sum of $2^{32}$ random variables in less than $1\mu s$.
- Develop the first ever algorithm for Gaussian and Poisson random variables in high dimensions.
- **Keywords**: Efficient Generation of Random Variables, Probabilistic Analysis, Wavelet Theory, Precomputation

**5. MP-RW-LSH: An Efficient Multi-Probe LSH Solution to ANNS-L1.**
*Wang, H., **Meng, J.**, Gong, L., Xu, J., Ogihara, M.* Published in VLDB 2021

- Design the first multi-probe LSH solution for approximate nearest neighbor search (ANNS) in L1 (Manhattan) distance. Achieve the best scalability-efficiency tradeoff among LSH algorithms so far.
- **Keywords**: Randomized Algorithms, Using Precomputation and Builtin Instructions

**6. Sliding-Window QPS: A Perfect Parallel Iterative Switching Algorithm for Input-Queued Switches.**
***Meng, J.**, Gong, L., Xu, J.* Published in Performance Evaluation Review 2020

- Develop a highly efficient scheduling algorithm for crossbar switches, which has the lowest possible time complexity of O(1) yet achieves over 90% normalized throughputs under various workloads.
- Have filed a patent application for this project, paid for by Georgia Tech Research Corporation.
- **Keywords**: Randomized Algorithms, Greedy Computation, Parallel Computation, Using Builtin Instructions

## SKILLS

**Languages** : C++, Python, MATLAB, SQL

**Tools** : Numpy, Eigen, OpenMP