

Jinrui (Jerry) Gou

Computer Science and Engineering
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EDUCATION	New York University	Brooklyn, NY
	Ph.D. in Computer Science	09/2021-Present
	Advisor: Professor Torsten Suel	
	Overall GPA: 3.97/4.0	
	M.S. in Computer Science	09/2019-05/2021
	Overall GPA: 4.0/4.0	
	Sun Yat-Sen University	Guangzhou, China
	B.E. in Computer Science & Technology	09/2015-06/2019
	Overall GPA: 90/100 (3.8/4.0)	
	Mathematics Courses GPA: 95/100	

KNOWLEDGE

- **Languages:** C/C++, Python, SQL, AMPL/CPLEX, Latex, MATLAB, Bash, HTML5.
- **Tools:** Scikit-learn, PyTorch, TensorFlow, Numpy, Matplotlib, TBB, AVX/AVX2, CUDA.
- **Courses Enrolled:** Computer Architecture, Natural Language Processing, Machine Learning (Rank 1st in Class of 43 students), Deep Learning, Web Search Engines, Design & Analysis of Algorithms (Rank 1st in Class of 47 students), Network Design and Algorithms (Rank 2nd in Class of 20 students), Algorithmic Machine Learning and Data Science.

RESEARCH EXPERIENCE

Ph.D. Research Assistant for Prof. Torsten Suel, NYU 09/2021-Present

1. Effective Candidate Generation and Threshold Estimation for Fast Top-K Query Processing

- Build specialized first-layer index structures that storing high-scoring postings.
- Fine-tune the storage of index structures and fit them into main memory for fast access.
- Reduce cache line miss by utilizing bloom filter to speed up lookups.
- Implement the entire process with 2000+ lines C++ code to provide high quality estimate of top-k threshold and promising candidates documents.

2. Graph Based Approximate Near-neighbor Search

- Propose navigable graph that can preform greedy routing for nearest neighbor search.
- Design randomized algorithms of adding links between nodes in high-dimension space to create effective navigable graphs.
- Explore and bound the max degree and average degree of navigable graphs with proof.
- Write efficient code to compute distances between high dimensional points and create routing tree.

3. Sparse Learned Index Structures Optimization

- Expand documents by generating related questions, using LLM Llama 2.
- Use ELECTRA-based relevance model to improve document expansion quality.
- Train BERT model CoCondenser to predict score of terms in documents.
- Fuse the knowledge from cross-encoder to improve training, using hard negatives and distillation.

Graduate Research Assistant for Prof. Yong Liu, Networked Systems Lab, NYU

09/2019-05/2021

1. Realtime Mobile Network QoS Prediction

- Collect mobile 4G/LTE bandwidth traces in Metro Area of NYC.
- Use ML models for realtime bandwidth prediction and network handoffs prediction.

2. Joint Traffic Routing and Computation Server Placement in Edge Cloud Networks

- Build quasi-convex optimization model to balance traffic and computation resource allocation.
- Use AMPL/CPLEX and Python optimization packages to obtain optimal feasible solutions.

PUBLICATIONS

1. **Jinrui Gou**, Yifan Liu, Minghao Shao, and Torsten Suel, “Beyond Quantile Methods: Improved Top-K Threshold Estimation for Traditional and Learned Sparse Indexes”, *submitted for publication*.
2. Soyuj Basnet, **Jinrui Gou**, Antonio Mallia, and Torsten Suel, “DeeperImpact: Optimizing Sparse Learned Index Structures”, in *ReNeuIR at SIGIR 2024: The Third Workshop on Reaching Efficiency in Neural Information Retrieval*, July 2024.
3. Haya Diwan, **Jinrui Gou**, Cameron Musco, Christopher Musco, and Torsten Suel, “Navigable Graphs for High-Dimensional Nearest Neighbor Search: Constructions and Limits”, *NeurIPS 2024: Conference on Neural Information Processing Systems*, December 2024.
4. Lifan Mei, **Jinrui Gou**, Yujin Cai, Houwei Cao, and Yong Liu, “Realtime mobile bandwidth and handoff predictions in 4G/5G networks”, *Computer Networks*, February 2022.
5. Lifan Mei, **Jinrui Gou**, Jingrui Yang, Yujin Cai, and Yong Liu, “On Routing Optimization in Networks with Embedded Computational Services”, *IEEE Transactions on Network and Service Management*, September 2024.

EMPLOYMENT EXPERIENCE

Teaching Assistant, ECE-GY 9343 Data Structures and Algorithms, NYU

Spring, Summer, Fall 2020

- Create homework questions, and grade homework submissions and exams.
- Help the professor answer students’ questions on Piazza, and hold online TA office hours.