# 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
Cumulative GPA: 3.97/4.0

M.S. in Computer Science — 09/2019-05/2021
Cumulative GPA: 4.0/4.0

**Sun Yat-Sen University** — Guangzhou, China
B.E. in Computer Science & Technology — 09/2015-06/2019
Cumulative GPA: 90/100 (3.8/4.0)
Mathematics Courses GPA: 95/100

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**KNOWLEDGE**

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- **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 $1^{st}$ in Class of 43 students), Deep Learning, Web Search Engines, Design & Analysis of Algorithms (Rank $1^{st}$ in Class of 47 students), Network Design and Algorithms (Rank $2^{nd}$ in Class of 20 students), Algorithmic Machine Learning and Data Science.

**RESEARCH EXPERIENCE**

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*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
    - Develop efficient and effective early termination algorithms for simple ranking functions.
    - Design specialized prefixes index structures and fine-tune its storage for efficient access.
    - Perform fast lookups using highly optimized index structures to improve the quality of results.
    - Implement 2000+ lines C++ code for experiments on different collections and ranking functions.
2. Graph Based Approximate Near-neighbor Search
    - Propose navigable graph that can preform greedy routing for nearest neighbor search.
    - Design efficient randomized algorithms to create effective sparse navigable graphs.
    - Bound the max degree and average degree of navigable graphs using mathematical proof.
    - Implement efficient python code for experiments on different graph datasets.

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 Prediction for High QoS
    - Collect mobile 4G/LTE bandwidth traces in Metro Area of NYC.
    - Develop LSTM RNN models for accurate realtime bandwidth prediction.
    - Develop Gradient Boosting models for handoffs predictions between 4G and 5G access modes.
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", *IEEE International Conference on Big Data, December 2024.*
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**, 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.*
5. 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*.

## 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.