Jie LIU

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EDUCATION

The Chinese University of Hong Kong Sep. 2018 — Present (anticipated grad.: Jun. 2020)
M.Phil. in Computer Science and Engineering GPA: 3.914 / 4
Advisors: Prof. James Cheng & Prof. Ming-Chang Yang

The Chinese University of Hong Kong Sep. 2013 — Jun. 2018
B. Sc. in Computer Science with ***Honours, First Class*** GPA: 3.505 / 4
Advisor: Prof. James Cheng

Dartmouth College Aug. 2015 — Dec. 2015
Exchange program in *Thayer School of Engineering, Dartmouth College*

RESEARCH INTERESTS

- Graph Mining, Graph Representation Learning, Graph Attention Networks
- Similarity Search

PUBLICATIONS

- **Jie Liu***, Xiao Yan*, Xinyan Dai, Zhirong Li, James Cheng, Ming-Chang Yang. Understanding and Improving Proximity Graph based Maximum Inner Product Search, *AAAI* 2020.
- Xinyan Dai*, Xiao Yan*, Kelvin K. W. Ng, **Jie Liu**, James Cheng. Norm-Explicit Quantization: Improving Vector Quantization for Maximum Inner Product Search, *AAAI* 2020 *(Oral)*.
- Xiao Yan, Xinyan Dai, **Jie Liu**, Kaiwen Zhou, James Cheng. Norm-Range Partition: A Universal Catalyst for LSH based Maximum Inner Product Search, [CoRR], 2018
- Jinfeng Li, Xiao Yan, Jian Zhang, An Xu, James Cheng, **Jie Liu**, Kelvin K.W. Ng, Ti-chung Cheng. A General and Efficient Querying Method for Learning to Hash, In Proceedings of the 2018 International Conference on Management of Data (*SIGMOD* 2018).

WORKING PAPERS

- **Jie Liu**, Yifan Hou, James Cheng, Xiaokui Xiao, Ming-Chang Yang. *Improving Graph Attention Networks by Incorporating Structural Information. (Target: KDD 2020)*

EXPERIENCE

National University of Singapore, Singapore Jul. 2019 — Aug. 2019
Research Intern
Topic: Simplifying Graph Neural Networks
Advisor: Prof. Xiaokui Xiao

ASM Pacific Technology Ltd, Hong Kong Sep 2016 — May 2017
Software Engineer (Gap-year Internship)

AWARDS

AAAI-20 Scholarship 2019
Dean's List, Faculty of Engineering, CUHK 2015, 2018
Niuniu Ji Scholarship 2015
S.H. Ho College Matriculation Scholarships for Academic Excellence 2014

SELECTED RESEARCH PROJECTS

Improving Graph Attention Networks by Incorporating Structural Information *Ongoing*
Jul. 2019 — Present *NUS & CUHK*

This project aims at improving Graph Attention Networks (GAT). GAT suffers from overfitting as the supervision information for attention parameter learning is indirect and limited. We propose to make attention parameter aware of graph structure in the training to alleviate the overfitting problem .

Graph-based Maximum Inner Product Search (MIPS) *Published in AAAI 2020*
Dec. 2018 — May 2019 *CUHK*

This project focused on understanding and improving graph-based MIPS methods. Instead of reducing MIPS to the nearest neighbor search problem, we proposed to use proximity graph directly to solve the MIPS problem and introduced a novel design to graph structure.

- Showed that MIPS has an unusual preference for large-norm items and supported the finding with theoretical and experimental justification.
- Explained the good performance of graph-based methods (e.g. ip-nsw) as matching the norm bias of the MIPS problem.
- Introduced an additional angular proximity graph on the top of inner product proximity graph, thereby significantly and consistently boosting the performance.

A General and Efficient Querying Method for Learning to Hash *Published in SIGMOD 2018*
Jun. 2017 — Aug. 2017 *CUHK*

This project focused on querying algorithms for light-weight binary code-based LSH. We designed a general querying method (GQR) to query on binary codes to achieve a comparable quality as heavy-weight quantization-based similarity search with a much lower computational cost.

- Investigated popular tree-based methods and demonstrated that tree-based methods had lower querying efficiency than hashing-based methods due to the curse of dimensionality using OpenCV.
- Showed that hamming distance is too coarse-grained in Learning to Hash and limits the performance of query processing.
- Jointly developed a new querying method GQR based on a more fine-grained similarity indicator — *quantization distance (QD).*

SKILLS

Programming languages:	C++ (Expert), Python (Proficient), C (Proficient), Bash (Proficient), Matlab (Intermediate)
Machine Learning Libraries:	PyTorch (Expert), DGL (Expert), Numpy (Expert), scikit-learn (Proficient)
Languages:	Mandarin (Native), English (Proficient), Cantonese (Fluent) TOEFL: 108 (R30 L30 S21 W27) GRE: 322 (V154 Q168) + 3.5 (Analytics)