Xiating Ouyang

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Research Interests

Database systems and **theoretical computer science**: Foundations for query processing, managing data under uncertainty, classification algorithms, graph theory and parameterized complexity.

Education

University of Wisconsin–Madison — Madison, WI
Ph.D. & M.Sc. in Computer Science — *Aug 2018 – Present*

Hong Kong Polytechnic University — Hong Kong
B.Sc. in Computing (1st Honor) — *Sep 2014 – Jun 2018*

University of Waterloo — Waterloo, ON
Exchange Program — *Jan 2017 – Apr 2017*

Research Experiences

University of Wisconsin–Madison with *Dr. Paraschos Koutris* — Madison, WI
Research Assistant: Managing data under uncertainty — *Aug 2019 – Present*

Hong Kong Polytechnic University with *Dr. Yixin Cao* — Hong Kong
Undergraduate Research Assistant: Algorithmic graph theory and parameterized complexity — *Oct 2015 – Jul 2018*

Publications

1. Yuping Ke, Yixin Cao, Xiating Ouyang, Wenjun Li and Jianxin Wang.
   Unit interval vertex deletion: Fewer vertices are relevant.
   Journal of Computer and System Sciences, 96:109–121, 2018. doi:10.1016/j.jcss.2018.01.001.

Industrial Experience

Thermo Fisher Scientific with *Lowell Rausch* — Madison, WI
Software Engineering Intern — *Jun 2019 – Sep 2019*

- **Code maintenance for release**: Fixed 10+ *critical* bugs for the spectrometer software with 2M+ lines of code.
- **Application crash diagnostics utility (shipped with the new release)**: Implemented an application to create dump files, capture snapshots and gather machine/user setting data.
- **Agile development**: 3-week sprints using JIRA; wrote test protocols and design documents; performed testing; implementation with frequent feedback from stakeholders.

Selected Projects

Accelerating hash join on star schemas using lookahead information processing (LIP) — 2019
Query optimization

- Implemented Bloom filters for each dimension table (10K tuples) to preprocess the gigantic fact table (6M tuples) before performing expensive joins. This project is advised by Prof. Jignesh Patel.
- Filters applied to the fact table in ascending order of estimated selectivity, computed by adaptively maintaining the hit/miss statistics from the previous k batches.
- Achieved 2X speed-up against normal hash-join on a dedicated system built on Apache Arrow.

Program synthesis: Loss analysis and prediction — 2018
Program synthesis

- Implemented a greedy synthesizer in Python/C# to automatically construct string transformation programs from examples in less than 0.2s among all 8149 examples in the benchmark released by Microsoft.
- Implemented a prediction algorithm to predict low synthesis loss with 89% accuracy.

Heuristic algorithm for the Steiner tree problem in graphs — 2018
Approximation algorithms

- Designed and implemented a heuristic approximation algorithm based on metric completion.
- Code submitted to an open competition PACE 18 at https://pacechallenge.wordpress.com/pace-2018/.

Simplified modular decomposition algorithm — 2017 – 2018
Final year project (received A+)

- Designed and implemented a simplified $O(m+n)$ algorithm in Python computing *all* groups of nodes in a network with the same neighborhood.
- Preprocessing input graphs using Lexicographical Breadth-First Search.
- No prior implementation is correct and our implementation scales up to graphs with 40K vertices.

Retina identification system 2017

Computer vision and biometrics security

- Image enhancement using morphological operators.
- Measured similarity with the SIFT algorithm in OpenCV.
- Achieved an identification accuracy of 97.5% on the STARE database.

Selected Honors And Awards

ACM-ICPC North Central North America Regional Contest, 10/208	2018
UW-Madison CS Special Scholarship, top 3%	2018
Hong Kong Special Administrative Region Government Scholarship, 3/2,200	2016, 2017, 2018
Faculty of Engineering Dean's Honors List, HK PolyU	2015, 2016, 2018
The Outstanding Student Award 2017, Department of Computing HK PolyU	2017
ACM-HK Chapter Collegiate Programming Contest, 3/34 & 3/37	2016, 2017

Services

Judge, Departmental coding competition, UW–Madison	2019 – 2019
Coach, ACM-ICPC team, HK PolyU	2017 – 2018
Webmaster and student organizer, COCOON'17 conference website development for 200+ attendees	2016 – 2017
Student organizer, SMARTCOMP'17	2017
Vice president, Exploring Hong Kong Community	2015 – 2016

Teaching Experiences

TA: CS 577 Introduction to Algorithms, UW–Madison	Spring 2019
TA: CS 240 Discrete Mathematics, UW–Madison	Fall 2018
TA: COMP 2422 Database Systems, HK PolyU	Fall 2017

Skills

Programming languages: C/C++/C#, Python, Java, PHP, JavaScript
Operating systems: Linux(Ubuntu), MacOS, Windows
Tools: git, Visual Studio/TFS, JIRA, LaTeX, tikz
Languages: English (proficient), Mandarin (native) and Cantonese (intermediate)