Kshitij Jain

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Research Interests

Approximation Algorithms, Computational Geometry, Graph Drawing, and Data Structures.

Education

University of Waterloo — Waterloo, Canada

Master of Mathematics (Thesis) in Computer Science with CGPA of 89.5/100 — *Sept. 2016 - Aug 2018 (Expected)*

- Member of the Algorithms & Complexity Group, working with Dr. Anna Lubiw.

Indraprastha Institute of Information Technology (IIIT-Delhi) — New Delhi, India

Bachelor of Technology in Computer Science and Engineering with CGPA of 9.16/10 — *Aug. 2011 - May 2015*

- Among top 5 students in the university.
- Specialization in Theoretical Computer Science

Publications

Therese Biedl, Timothy M. Chan, Martin Derka, **Kshitij Jain**, and Anna Lubiw, Improved Bounds for Drawing Trees on Fixed Points with L-shaped Edges. **In the 25th International Symposium on Graph Drawing and Network Visualization (GD 2017)**.

Research Projects

Approximation algorithm for Minimum Shared-Power Edge Cut — University of Waterloo

Mentor: Dr. Anna Lubiw — *April 2017 - Present*

- A Fully Polynomial Time Approximation Scheme (FPTAS) for the minimum shared-power edge cut problem that generalizes shrinkage for barrier coverage of a wireless sensor network.
- Polynomial time algorithms for the restricted setting of unweighted graphs and bounded edge costs.

Compatible Paths and Trees in Two Labeled Point Sets — Carleton University

Fields Workshop on Discrete and Computational Geometry — *Aug 2017-Present*

- For two point sets in the convex position, the existence of compatible paths can be decided in linear time.
- An $O(n^2)$ time dynamic programming algorithm to test for a compatible path in a pair of simple polygons.
- For point sets in general position, the existence of compatible monotone paths can be decided in quadratic time.

Approximation algorithm for geometric k-centers of unit disc graphs — University of Waterloo

Mentor: Dr. Anna Lubiw — *Jan 2017-Present*

- Worked on improving the approximation ratio for geometric k-center in unit disk graphs and on also extending the result to the capacitated setting.

Improved Bounds for Drawing Trees on Fixed Points with L-shaped Edges — University of Waterloo

Joint work with Therese Biedl, Timothy M. Chan, Martin Derka, and Anna Lubiw — *Sept 2016 - Dec 2016*

- Improve the bounds of the size of the point set for drawing trees with L-shaped edges to $O(n^{1.55})$ for ternary trees, $O(n^{1.22})$ for binary trees, and $O(n^{1.142})$ for perfect binary trees.
- A bound of $O(n \log n)$ points for L-shaped drawings of ordered caterpillars and negative examples illustrating that n points don't suffice.

Separator theorem for Disc Graphs — IIIT-Delhi

Mentor: Dr. Rajiv Raman — *Jan 2014 - May 2015*

- A $1/3 : 2/3$ line separator for disk graphs such that the line intersects with at most $O(\sqrt{n})$ discs using randomization and linear programming duality.

Work Experience

Consultant, Correlation One — *May 2017 - Present*

- Developed technical problems for Correlation One's Quantitative Vetting Platform.
- Focused on machine learning, probability, algorithms, and data structure problems.

Software Engineer, Media.net — *June 2015 - July 2016*

- Implemented a statistical machine learning models for real time bid prediction of online Ad slots in Java.
- Real time data consumption from MS-SQl, Hadoop, and Redis. Integration with an end-to-end testing framework using web APIs and JUnit.

Summer Research Intern, Xerox Research Center India *May 2014 - July 2014*

- Built an Android application to generate dynamic word clouds for educational videos.
- Developed a feedback system using Natural Language Processing to capture useful metadata for videos.

Summer Intern, Indian Institute of Technology Bombay *May 2013 - July 2013*

- Implemented a peer evaluation system for open graded answers and integrated it with the open source MOOC system, Edx.

Teaching Experience

CS 234, Data Types and Structures University of Waterloo
Teaching Assistant *Sep 2017 - Present*
- Responsible for grading assignments and exams.

CS 458/658, Computer Security and Privacy University of Waterloo
Teaching Assistant *Jan 2017 - Aug 2017*
- Designed and graded assignments on security, privacy and anonymity. Also, responsible for marking both graduate and senior undergraduate exams.

CS 135, Designing Functional Programs University of Waterloo
Teaching Assistant *Sep 2016 - Dec 2016*
- Responsibilities included marking assignments and exams for first year students.

CPP101, Competitive Programming IIIT-Delhi
Head Student Instructor *May 2015 - Aug 2015*
- Responsible for course design and planning, managing other TAs, creating and grading both theoretical as well as lab exams.

CSE222, Analysis and Design of Algorithms IIIT-Delhi
Teaching Assistant *Jan 2015 - May 2015*
- Conducted tutorials, labs and created programming assignments for second year undergraduate core course.

IOI Preparatory Workshop for School Students IIIT-Delhi
Head Student Mentor *Aug 2014 - Nov 2014*
- Responsible for designing and planning the workshop structure, preparing contests, collaborating with IIT, Delhi and Codechef and managing other mentors.
- Seven students were selected for the IOI Training Camp-2015 and one of them won a bronze medal for India at IOI, 2015.

Professional Activities

2017	**Board of Directors**, Graduate Studies Endowment Fund	University of Waterloo
2014-2015	**Admin**, Competitive Programming Club of IIIT-Delhi, FooBar	IIIT-Delhi
2013	**Member**, Organizing Committee for IIIT-Delhi technical festival, Esya-2013	IIIT-Delhi
2012-2013	**Treasurer**, ACM Student Chapter at IIIT-Delhi	IIIT-Delhi

Honors & Awards

Scholarships

2017	ACM SIGACT student travel grant for attending STOC'17	Montreal, Canada
2017	Fields Institute student grant for Workshop on Discrete and Computational Geometry	Carleton University
2016-2018	International Masters Student Award	University of Waterloo
2016-2017	Graduate Excellence Award in Computer Science	University of Waterloo
2014	Scholarship for Symposium on Learning, Algorithms and Complexity	Indian Institute of Science
2014	Full scholarship awarded for Summer Research Frontier Workshop	National University of Singapore

Data Science

2017	Ranked **3rd** at Citadel & Correlation One Waterloo Datathon	Waterloo, Canada
2016	Ranked **2nd** at Citadel & Correlation One Toronto Datathon	Toronto, Canada
2016	Ranked **7th** at India Hacks-Machine Learning Contest	Hackerearth

Competitive Programming

2017	Finalist at Communitech Code 2 Win	Waterloo, Canada
2016	Finalist at Codechef Snackdown, among top 50 teams worldwide	Mumbai, India
2014	Honorable mention at ACM ICPC Regionals	Amritapuri & Gwalior, India