

# Rajesh Jayaram

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CONTACT INFORMATION	5105 Gates Hillman Center Computer Science Department Carnegie Mellon University Pittsburgh, PA 15213  rkjayara@cs.cmu.edu <a href="https://rajeshjayaram.com">https://rajeshjayaram.com</a>	
RESEARCH INTERESTS	Data Stream and Sketching Algorithms, Sublinear Algorithms, Distributed Computation, Machine Learning, Property Testing.	
EDUCATION	<b>Carnegie Mellon University</b> PhD, Computer Science Advised by David P. Woodruff	Pittsburgh, PA <i>2017 - Present</i>
	<b>Brown University</b> ScB Mathematics and Computer Science	Providence, RI <i>Class of 2017</i>
	<b>University of Massachusetts Amherst</b> Double Major in Mathematics and Computer Science	Amherst, Massachusetts <i>Sept. 2013 – May 2015</i>
EMPLOYMENT	<b>Google, New York</b> Research Intern Hosts: Vahab Mirrokni and Mohammad Hossein Bateni.	<i>Summer 2020</i>
VISITING	<b>Simons Institute</b> Visiting Graduate Student. Probability, Geometry, and Computation in High Dimensions Foundations of Data Science	<i>Fall 2020.</i> <i>Fall 2018.</i>
ACHIEVEMENTS & AWARDS	<ul style="list-style-type: none"><li>• Paper [2] won Best Paper Award at <b>PODS</b> 2020, and was invited to the Journal of the ACM.</li><li>• Paper [7] won Best Paper Award at <b>PODS</b> 2019, and was invited to the Journal of the ACM.</li><li>• Paper [7] won a 2019 ACM SIGMOD Research Highlight Award.</li><li>• Paper [7] invited as a Plenary talk to <b>STOC</b> 2020 TheoryFest, deferred to <b>STOC</b> 2021 due to COVID-19.</li><li>• Magna cum Laude, Brown University Class of 2017 (highest Latin honor at Brown)</li><li>• Departmental Honors in Computer Science, Brown University Class of 2017</li><li>• 4.0/4.0 Undergraduate GPA.</li><li>• Presidential Scholarship, University of Massachusetts Amherst.</li></ul>	

UNDERGRAD  
RESEARCH

**Undergrad Thesis**  
Brown University  
Advisor: Eli Upfal

*Sept. 2016 – May 2017*

**NSF Research Experience for Undergraduates (REU)**  
University of Massachusetts Amherst  
Advisor: Barna Saha

*Summer 2016*

**Budapest Semesters in Mathematics**  
Advisor: Arpad Toth

*Summer 2015*

MANUSCRIPTS

1. *Learning and Testing Junta Distributions with Subcube Conditioning.*  
Xi Chen, Rajesh Jayaram, Amit Levi, and Erik Waingarten.
2. *An FPRAS and Polynomial-Time Uniform Sampler for Tree Automata*  
Marcelo Arenas, Luis Alberto Croquevielle, Rajesh Jayaram, and Cristian Riveros.

PUBLICATIONS

**Note:** By convention in theoretical computer science, authors are ordered alphabetically by last name.

1. *Testing Positive Semi-Definiteness via Random Submatrices.*  
Ainesh Bakshi, Nadiia Chepurko, Rajesh Jayaram  
IEEE Symposium on Foundations of Computer Science (**FOCS**) 2020  
(all student paper)
2. *A Framework for Adversarially Robust Streaming Algorithms.*  
Omri Ben-Eliezer, Rajesh Jayaram, David Woodruff, and Eylon Yogev,  
ACM Symposium on Principles of Database Systems (**PODS**) 2020  
**PODS Best Paper Award, 2020. Invited to the Journal of the ACM.**
3. *Span Recovery for Deep Neural Networks with Applications to Input Obfuscation.*  
Rajesh Jayaram, Qiuyi Zhang and David Woodruff.  
International Conference on Learning Representations (**ICLR**) 2020
4. *Optimal Sketching for Kronecker Product Regression and Low Rank Approximation.*  
Huain Diao, Rajesh Jayaram, Zhao Song, Wen Sun, and David P. Woodruff.  
Neural Information Processing Systems (**NeurIPS**) 2019
5. *Towards Optimal Moment Estimation in Streaming and Distributed Models.*  
Rajesh Jayaram and David P. Woodruff.  
International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (**APPROX**) 2019
6. *Learning Two Layer Rectified Neural Networks in Polynomial Time.*  
Ainesh Bakshi, Rajesh Jayaram, and David P. Woodruff.  
ACM Conference on Learning Theory (**COLT**) 2019
7. *Efficient Logspace Classes for Enumeration, Counting, and Uniform Generation.*  
Marcelo Arenas, Luis Alberto Croquevielle, Rajesh Jayaram, and Cristian Riveros.  
ACM Symposium on Principles of Database Systems (**PODS**) 2019  
**PODS Best Paper Award, 2019. Invited to the Journal of the ACM.**
8. *Weighted Reservoir Sampling from Distributed Streams.*  
Rajesh Jayaram, Gorkarna Sharma, Srikanta Tirthapura, and David P. Woodruff.  
ACM Symposium on Principles of Database Systems (**PODS**) 2019

9. *Perfect  $L_p$  Sampling in a Data Stream.*  
Rajesh Jayaram and David P. Woodruff.  
IEEE Symposium on Foundations of Computer Science (**FOCS**) 2018
10. *Data Streams with Bounded Deletions.*  
Rajesh Jayaram and David P. Woodruff.  
ACM Symposium on Principles of Database Systems (**PODS**) 2018
11. *Approximating Language Edit Distance Beyond Fast Matrix Multiplication: Ultralinear Grammars Are Where Parsing Becomes Hard!.*  
Rajesh Jayaram and Barna Saha.  
International Colloquium on Automata, Languages and Programming (**ICALP**) 2017

MANUSCRIPTS

1. *Learning Stochastically Evolving Networks via Local Probing*, Rajesh Jayaram. Undergrad Senior Honors Thesis, advised by Eli Upfal (<http://rajeshjayaram.com/Thesis.pdf>).

TALKS

**Testing Positive Semi-Definiteness via Random Submatrices.**

2020 Workshop on Local Algorithms (**WOLA**)

2020 Harvard Center of Mathematical Science and Applications: Computer Science for Mathematicians Seminar *Forthcoming*

2020 Carnegie Mellon University, Theory Lunch *Forthcoming*

**A Framework for Adversarially Robust Streaming Algorithms**

2020 Symposium on Principles of Database Systems (**PODS**)

2020 Google NYC Intern Talks

**An FPRAS for Counting Path Labelings and Regular Languages.**

2019 Carnegie Mellon University, Theory Lunch (based on paper [7])

**Towards Optimal Moment Estimation in Streaming and Distributed Models**

2019 Workshop on Approximation Algorithms for Combinatorial Optimization Problems (**APPROX**)

**Weighted Reservoir Sampling from Distributed Streams**

2019 Symposium on Principles of Database Systems (**PODS**)

**Learning Two Layer Rectified Neural Networks in Polynomial Time**

2019 ACM Conference on Learning Theory (**COLT**)

2019 Simons Institute Foundations of Data Science Reunion

2020 Pontifical Catholic University of Chile *Forthcoming*

**Perfect  $L_p$  Sampling in a Data Stream**

2018 Symposium on Foundations of Computer Science (**FOCS**)

**Data Streams with Bounded Deletions**

2018 Carnegie Mellon University, Theory Lunch

2018 Symposium on Principles of Database Systems (**PODS**)

**Approximating Language Edit Distance Beyond Fast Matrix Multiplication**

2017 International Colloquium on Automata, Languages and Programming (**ICALP**)

SERVICES

2019-2020 Organizer of the Carnegie Mellon Theory Lunch Seminar

<https://www.cs.cmu.edu/~theorylunch/>

Subreviewer for ISIT '19, ICALP 19', CCC 19', APPROX 19', RANDOM 19', ITCS '20, SODA 20', STOC 20', JMLR, Algorithmica, FOCS 20', NeurIPS 20' (Official Reviewer), SODA 20'

TEACHING	<p><b>Teaching Assistant</b> <span style="float: right;"><i>Fall 2019</i></span>  Computer Science 15-859 - Algorithms for Big Data  Instructor: David P. Woodruff, Carnegie Mellon University</p> <p><b>Teaching Assistant</b> <span style="float: right;"><i>Spring 2019</i></span>  Computer Science 15-451 - Algorithms  Instructor: David P. Woodruff and Anupam Gupta, Carnegie Mellon University</p> <p><b>Head Teaching Assistant</b> <span style="float: right;"><i>Fall 2016</i></span>  Computer Science 157 - Design and Analysis of Algorithms  Instructor: Paul Valiant, Brown University</p> <p><b>Teaching Assistant</b> <span style="float: right;"><i>Spring 2016</i></span>  Computer Science 22 - Discrete Structures and Probability  Instructor: Caroline Klivans, Brown University</p> <p><b>Math Tutor</b> <span style="float: right;"><i>Sept. 2014 – May 2015</i></span>  University of Massachusetts Amherst, Learning Resource Center</p>
PROFICIENCIES	Java, Python, C, Matlab, Mathematica.
REFERENCES	<p><b>David Woodruff</b> Associate Professor, Carnegie Mellon University  <b>Marcelo Arenas</b> Professor, Pontificia Universidad Católica de Chile  <b>Xi Chen</b> Associate Professor, Columbia  <b>Vahab Mirrokni</b> Distinguished Scientist, Google</p>