Sushant Sachdeva
Postdoctoral Associate, Yale University

CONTACT INFORMATION	sachdevasushant@gmail.com https://sachdevasushant.github.io/

RESEARCH INTERESTS

Algorithms, and its connections to learning, optimization, and statistics

My recent research has focused on the design of fast algorithms, using techniques from convex optimization, numerical linear algebra, and approximation theory.

APPOINTMENTS

Google	Mountain View, CA
Research Scientist	Aug 2016 – Present
Yale University	New Haven, CT
Postdoctoral Associate, Department of Computer Science Supervisor: Prof. Daniel Spielman	Jan 2014 – July 2016
Lecturer, Department of Computer Science	Jan 2015 – May 2015
UC Berkeley, Simons Institute for the Theory of Computing	Berkeley, CA
Simons Research Fellow Program: Real Analysis in Computer Science	Aug 2013 – Dec 2013

EDUCATION

Princeton University	Princeton, NJ
Ph.D., Department of Computer Science Thesis: New Results in the Theory of Approximation — Fast Graph Algorithms and Inapproximability Adviser: Prof. Sanjeev Arora Area of study: Theoretical Computer Science	Sep 2008 - Sep 2013
M.A., Department of Computer Science GPA: 4.0/4.0	Sep 2008 – Jun 2010
Indian Institute of Technology Bombay	Mumbai, India
B.Tech., Department of Computer Science and Engineering Adviser: Sundar Vishwanathan CPI: 9.97/10.00	Jul 2004 – Aug 2008

HONORS AND AWARDS

Awarded **President of India Gold Medal** for topping the class of 2008 (of 500+ students)

Ranked **1st all over India** in IIT Entrance Examination 2004 (among 170,000+ students)

Bronze Medalist at 36th International Chemistry Olympiad (IChO) 2004, Kiel, Germany

Represented IIT Bombay at **ACM ICPC World Finals, Tokyo 2007**

Scored a perfect SPI of 10.0 in 7 semesters out of 8 at IIT Bombay

Awarded a grade of AP for outstanding performance in ten courses at IIT Bombay

Awarded Jayanti Deshmukh Memorial Gold Medal for being the most outstanding B.Tech. student in the computer science class of 2008 (out of 35 students)

Awarded Aditya Birla Scholarship 2004–08, covering my undergraduate studies. It is awarded to only 10 engineering students each year.

Awarded Dhirubai Ambani Scholarship 2004–08 for being among the top 10 students of Maharashtra state in AISSCE 2004.

Awarded Kishore Vaigyanik Protsahan Yojana (KVPY) fellowship 2002–04. Awarded to

around 50 students each year; aimed at promoting research careers in the sciences.

MONOGRAPHS	*Faster Algorithms via Approximation Theory* S. Sachdeva, N. K. Vishnoi In Foundations and Trends in Theoretical Computer Science 9.2 (FTTCS) 2014, pp. 125-210

REFEREED
JOURNAL
PUBLICATIONS

An Arithmetic Analogue of Fox's Triangle Removal Argument
P. Hatami, S. Sachdeva, M. Tulsiani
In Online Journal of Analytic Combinatorics 11 (OJAC) 2016

Provable ICA with Unknown Gaussian Noise, and Implications for Gaussian Mixtures and Autoencoders
S. Arora, R. Ge, A. Moitra, S. Sachdeva
In Algorithmica 72.1 (May 2015), pp. 215–236

Inapproximability of Minimum Vertex Cover on k-Uniform k-Partite Hypergraphs
V. Guruswami, S. Sachdeva, R. Saket
In SIAM Journal on Discrete Mathematics 29.1 (SIDMA) 2015, pp. 36–58

REFEREED
CONFERENCE /
WORKSHOP
PUBLICATIONS

Sparsified Cholesky and Multigrid Solvers for Connection Laplacians
R. Kyng, Y. T. Lee, R. Peng, S. Sachdeva, and D. A. Spielman
To appear at 48th ACM Symposium on Theory of Computing (STOC) 2016

Fast, Provable Algorithms for Isotonic Regression in all ℓ_p-norms
R. Kyng, A. Rao, S. Sachdeva
In 29th Advances in Neural Information Processing Systems (NIPS) 2015

Algorithms for Lipschitz Learning on Graphs
R. Kyng, A. Rao, S. Sachdeva, D. A. Spielman
In 28th Conference on Learning Theory (COLT) 2015

Simultaneous Approximation of Constraint Satisfaction Problems
A. Bhangale, S. Kopparty, S. Sachdeva
In 42nd International Colloquium on Automata, Languages, and Programming (ICALP) 2015

Optimal Inapproximability for Scheduling Problems via Structural Hardness for Hypergraph Vertex Cover
S. Sachdeva, R. Saket
In 28th IEEE Conference on Computational Complexity (CCC) 2013

Approximating the Exponential, the Lanczos Method and an $\tilde{O}(m)$-Time Spectral Algorithm for Balanced Separator
L. Orecchia, S. Sachdeva, N. K. Vishnoi
In 44th ACM Symposium on Theory of Computing (STOC) 2012

Provable ICA with Unknown Gaussian Noise, and Implications for Gaussian Mixtures and Autoencoders
S. Arora, R. Ge, A. Moitra, S. Sachdeva
In 26th Advances in Neural Information Processing Systems (NIPS) 2012

Finding Overlapping Communities in Social Networks: Towards a Rigorous Approach
S. Arora, R. Ge, S. Sachdeva, G. Schoenebeck
In 13th ACM Conference on Electronic Commerce (EC) 2012

Testing Permanent Oracles — Revisited
S. Arora, A. Bhattacharyya, R. Manokaran, S. Sachdeva
In 16th International Workshop on Randomization and Computation (RANDOM) 2012

Nearly Optimal NP-Hardness of Vertex Cover on k-Uniform k-Partite Hypergraphs
S. Sachdeva, R. Saket
In 14th International Workshop on Approximation Algorithms for Combinatorial Optimization
Problems (APPROX) 2011

SELECT MANUSCRIPTS	*A Simple Analysis of the Dikin Walk* S. Sachdeva, N. Vishnoi

Cuts in Cartesian Products of Graphs
S. Sachdeva, M. Tulsiani

THESES	*New Results in the Theory of Approximation: Fast Graph Algorithms and Inapproximability* Ph.D. Thesis, Princeton University, 2013. Advised by Sanjeev Arora

On the Hardness of Approximating Vertex Cover
B.Tech. Thesis, IIT Bombay, 2008. Advised by Sundar Vishwanathan

OTHER PUBLICATIONS	*Greedy Geometric Algorithms for Collection of Balls, with Applications to Geometric Approximation and Molecular Coarse-Graining* F. Cazals, T. Dreyfus, S. Sachdeva, N. Shah In Computer Graphics Forum 33–6, 2014

On the Characterization and Selection of Diverse Conformational Ensembles with Applications to Flexible Docking
S. Loriot, S. Sachdeva, K. Bastard, C. Prevost, F. Cazals
In Computational Biology and Bioinformatics, IEEE/ACM Transactions on 8.2 (TCBB) 2011,
pp. 487–498

TALKS	*Regression on Graphs – Lipschitz and Isotonic* University of Chicago, Scientific and statistical computing seminar, Nov 2015

Lipschitz Learning on Graphs
IIT Bombay, CS department seminar, Jul 2015
EPFL (École Polytechnique Fédérale de Lausanne) INF department seminar, Jul 2015
Conference on Learning Theory (COLT), Paris, Jul 2015
UC San Diego, CS department theory seminar, May 2015
Yale University, Statistics department seminar, Apr 2015

Triangle Removal in Groups
Simons Institute, UC Berkeley, Real analysis seminar, Nov 2013
Institute for Advanced Study (IAS) Computer science/discrete mathematics seminar, Apr 2013

Generalizations of KKL Theorem and Friedgut's Junta Theorem
Simons Institute, UC Berkeley, Real analysis workshop, Aug 2013

Hardness for Scheduling Problems
Conference on Computational Complexity (CCC), Palo Alto, Jun 2013

Near-linear Time Algorithms for Balanced Separator
Rutgers University, DIMACS/CS theoretical computer science seminar, Mar 2013
University of Washington, ETP theory connections, Aug 2012
Symposium on Theory of Computing (STOC), New York, May 2012
Institute for Advanced Study (IAS) Computer science/discrete mathematics seminar, Apr 2012

Testing Permanent Oracles
International Workshop on Randomization and Computation (RANDOM), Boston, Aug 2012

PROFESSIONAL SERVICE	*Reviewer:* SODA 2016, STOC 2015, SODA 2015, SIDMA, QIC, Random 2014, FOCS 2014, STOC 2014, FSTTCS 2013, SODA 2014, Approx 2013, TOC, Algorithmica, ITCS 2013, SODA 2013, ICALP 2012, LATIN 2012, SODA 2012, FSTTCS 2011

TEACHING
EXPERIENCE

Lecturer, Yale University

Lecturer for CPSC 665 : An Algorithmist's toolkit   Spring 2015
Designed and taught a full course on advanced algorithms (2 lectures a week)
55% of students rated the course excellent (highest rating)

Teaching Assistant, Princeton University

Assistant in Instruction for COS 433: Cryptography   Spring 2010
Taught weekly precepts, organized weekly question hours, graded assignments and exams

Assistant in Instruction for COS 340: Reasoning About Computation   Fall 2009
Taught weekly precepts, organized weekly question hours, graded assignments and exams
Taught one 1.5-hr lecture

PROFESSIONAL
EXPERIENCE

Toyota Technological Institute   Chicago, IL

Research Intern, Summer 2012
Supervisor: Yury Makarychev
Lower bounds for Vertex Sparsifiers.

Microsoft Research India   Bangalore, India

Research Intern, Summer 2011
Supervisor: Nisheeth K. Vishnoi
Fast algorithms for Balanced Separator.

INRIA   Sophia-Antipolis, France

Research Intern, Summer 2007
Supervisor: Frederic Cazals (Research Director, Geometrica group).
Selecting a representative set of protein conformers.

ETH   Zurich, Switzerland

Research Intern, Summer 2006
Supervisor: Riko Jacob (Algorithms, Data Structures, and Applications group).
Cache efficiency of shortest path algorithms with preprocessing.

REFERENCES

Prof. Daniel Spielman (spielman@cs.yale.edu)
Henry Ford II Professor of Computer Science, Mathematics, and Applied Mathematics
Yale University

Prof. Sanjeev Arora (arora@cs.princeton.edu)
Charles C. Fitzmorris Professor of Computer Science
Princeton University
(Please contact admin. assistant Mitra Kelly at mkelly@cs.princeton.edu)

Prof. Nisheeth K. Vishnoi (nisheeth.vishnoi@epfl.ch)
Associate Professor of Computer Science
EPFL (École Polytechnique Fédérale de Lausanne)

Prof. John Lafferty (lafferty@galton.uchicago.edu)
Louis Block Professor at Departments of Statistics, Computer Science, and the College
University of Chicago

Prof. Jonathan Kelner (kelner@mit.edu)
Mark Hyman, Jr. Career Development Associate Professor of Applied Mathematics
MIT (Massachusetts Institute of Technology)