Rajesh Chitnis

BASIC INFORMATION

Current Position: Research Fellow at University of Warwick

Contact Information: Room 231, Department of Computer Science
University of Warwick, Coventry CV4 7AL, UK
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RESEARCH INTERESTS

Fine-grained Algorithms and Complexity, Streaming Algorithms, Graph Theory.

EDUCATION

- **Weizmann Institute of Science**, Rehovot, Israel
  Postdoctoral Fellow   **Sept. '14 - Sept. '17**
  Mentors: Prof. Robi Krauthgamer and Prof. Uri Feige

- **University of Maryland**, College Park, MD USA
  Doctor of Philosophy, Computer Science   **Aug. '10 - Dec. '14**
  Title of Dissertation: Directed Graphs: Fixed-Parameter Tractability and Beyond
  Advisor: Prof. MohammadTaghi Hajiaghayi

- **University of Maryland**, College Park, MD USA
  Masters in Computer Science   **Aug. '10 - May '13**

- **Chennai Mathematical Institute**, Chennai, INDIA
  Bachelor of Science (Honors)   **Aug. '07 - Apr. '10**
  Subjects: Mathematics and Computer Science

HONORS AND AWARDS

- $48,000 Simons Award for Graduate Students in Theoretical Computer Science (2013-15)

- Larry S. Davis Doctoral Dissertation Award for PhD thesis from University of Maryland.

- College of Computer, Mathematical, & Natural Sciences (CMNS) Board of Visitor's Award for Outstanding Graduate Student at University of Maryland (awarded to 2 students out of the 10 departments in the college).

- Best Paper Award in ESA 2013

- Gannon Award for Outstanding Graduate Students by University of Maryland (2013)

- International Research Fellowship by University of Maryland for research visits in Summer 2012.

PUBLICATIONS

Manuscripts

1. **Parameterized Approximation Algorithms for Directed Steiner Network Problems**. Joint work with Andreas Emil Feldmann and Pasin Manurangsi.

Journal Papers

2. **Faster Exact Algorithms for Some Terminal Set Problems**. *J. Comput. Syst. Sci. 88: 195-207 (2017)*. Joint work with Fedor Fomin, Daniel Lokshtanov, Pranabendu Misra, M.S. Ramanujan and Saket Saurabh.

3. **Designing FPT algorithms for Cut Problems using Randomized Contractions**. *SIAM Journal of Computing 45(4), 1171-1229 (2016)*. Joint work with Marek Cygan, MohammadTaghi Hajiaghayi, Marcin Pilipczuk and Michał Pilipczuk.

4. **List *H*-Coloring a Graph by Removing a Few Vertices**. *Algorithmica 78(1): 110-146 (2017)*. Joint work with Laszlo Egri and Dániel Marx.

5. **A Tight Algorithm for Strongly Connected Steiner Subgraph On Two Terminals With Demands**. *Algorithmica 77(4): 1216-1239 (2017)*. Joint work with Hossein Esfandiari, MohammadTaghi Hajiaghayi, Rohit Khandekar, Guy Kortsarz and Saeed Seddighin.

6. **Parameterized Complexity of the Anchored *k*-Core Problem for Directed Graphs**. In *Information and Computation* 247: 11-22. (2016). Joint work with Fedor Fomin and Petr Golovach.

7. **Directed Subset Feedback Vertex Set is FPT**. In *ACM Transactions on Algorithms* 11(4):28, 2015. Joint work with Marek Cygan, MohammadTaghi Hajiaghayi and Dániel Marx.

8. **Fixed-Parameter Tractability of Directed Multiway Cut Parameterized by Size of the Cutset.** *SIAM Journal of Computing 42(4): 1674-1696. (2013)*. Joint work with MohammadTaghi Hajiaghayi and Dániel Marx.

9. **On the SIG dimension of trees under the L_∞ metric**. *Graphs and Combinatorics 29(4): 773-794 (2013)*. Joint work with L. Sunil Chandran and Ramanjit Kumar.

Conference Papers

10. **A Tight Lower Bound for the Steiner Orientation problem**. In *CSR 2018*. Joint work with Andreas Emil Feldmann.

11. **Can We Create Large *k*-Cores by Adding Few Edges?**. In *CSR 2018*. Joint work with Nimrod Talmon.

12. **Algorithms and Hardness Results for Nearest Neighbor Problems in Bicolored Point Sets**. In *LATIN 2018*. Joint work with Sandip Banerjee and Sujoy Bhore

13. **Tight Bounds for Gomory-Hu-like Cut Counting**. In *WG 2016*. Joint work with Lior Kamma and Robert Krauthgamer.

14. **Kernelization via Sampling with Applications to Dynamic Graph Streams**. In *SODA 2016*. Joint work with Graham Cormode, Hossein Esfandiari, MohammadTaghi Hajiaghayi, Andrew McGregor, Morteza Monemizadeh and Sofya Vorotnikova

15. **New Streaming Algorithms for Parameterized Maximal Matching and Beyond**. In *SPAA 2015* (short paper). Joint work with Graham Cormode, Hossein Esfandiari, MohammadTaghi Hajiaghayi and Morteza Monemizadeh.

16. **Parameterized Streaming Algorithms for Vertex Cover**. In *SODA 2015*. Joint work with Graham Cormode, MohammadTaghi Hajiaghayi and Morteza Monemizadeh.

17. **A Tight Algorithm for Strongly Connected Steiner Subgraph On Two Terminals With Demands**. In *IPEC 2014*. Joint work with Hossein Esfandiari, MohammadTaghi Hajiaghayi, Rohit Khandekar, Guy Kortsarz and Saeed Seddighin.

18. **Tight Bounds for Planar Strongly Connected Steiner Subgraph with Fixed Number of Terminals (and Extensions)**. In *SODA 2014*. Joint work with MohammadTaghi Hajiaghayi and Dániel Marx.

19. **Parameterized Complexity of the Anchored *k*-Core Problem for Directed Graphs**. In *FSTTCS 2013*. Joint work with Fedor Fomin and Petr Golovach.

20. **Faster Exact Algorithms for Some Terminal Set Problems**. In *IPEC 2013*. Joint work with Fedor Fomin, Daniel Lokshtanov, Pranabendu Misra, M.S. Ramanujan and Saket Saurabh.

21. **Fixed-Parameter and Approximation Algorithms: A New Look**. In *IPEC 2013*. Joint work with MohammadTaghi Hajiaghayi and Guy Kortsarz.

22. **List *H*-Coloring a Graph by Removing a Few Vertices**. In *ESA 2013*. Joint work with Laszlo Egri and Dániel Marx.

23. **Preventing Unraveling in Social Networks Gets Harder**. In *AAAI 2013*. Joint work with Fedor Fomin and Petr Golovach.

24. **A Game-Theoretic Model for the DARPA Network Challenge**. In *SPAA 2013* (short paper). Also appeared in *Workshop on Risk Aversion in Algorithmic Game Theory and Mechanism Design*. Joint work with MohammadTaghi Hajiaghayi, Jonathan Katz and Koyel Mukherjee.

25. **Designing FPT algorithms for Cut Problems using Randomized Contractions**. In *FOCS 2012*. Joint work with Marek Cygan, MohammadTaghi Hajiaghayi, Marcin Pilipczuk and Michał Pilipczuk.

26. **Directed Subset Feedback Vertex Set is FPT**. In *ICALP 2012*. Joint work with Marek Cygan, MohammadTaghi Hajiaghayi and Dániel Marx.

27. **Fixed-Parameter Tractability of Directed Multiway Cut Parameterized by Size of the Cutset**. In *SODA 2012*. Joint work with MohammadTaghi Hajiaghayi and Dániel Marx.

28. **Parameterized Complexity of Problems in Coalitional Resource Games**. In *AAAI 2011*. Joint work with MohammadTaghi Hajiaghayi and Vahid Liaghat.

29. **Parameterized Algorithms for Boxicity**. In *ISAAC 2010*. Joint work with Abhijin Adiga and Saket Saurabh.

Book Chapters

30. **Shadowless Solutions for Fixed-Parameter Tractability of Directed Graphs**. In *Encyclopedia of Algorithms* (2015). Jointly written with MohammadTaghi Hajiaghayi.

Book Reviews

31. Review of **Fundamentals of Parameterized Complexity** by Rodney G. Downey and Michael R. Fellows. In *SIGACT News* 46(1): 23-26. (2015)

TEACHING EXPERIENCE

As **Instructor** (at Weizmann):

- Exact Algorithms for NP-hard Problems in Spring '16

As **Teaching Assistant** (at Maryland):

- CMSC 858F - Algorithmic Game Theory in Spring '14
  Duties included grading homeworks.
- CMSC 351 - Introduction to Algorithms in Spring '13
  Duties included preparing homeworks, holding office hours, grading homeworks and exams.
- CMSC 351 - Introduction to Algorithms in Spring '12
  Duties included preparing lecture notes and grading exams.
- CMSC 250 - Discrete Structures in Spring '11
  Duties included conducting discussion sections, holding office hours, grading homeworks and exams.
- CMSC 451 - Algorithms in Fall '10
  Duties included holding office hours, grading homeworks and exams.

RESEARCH EXPERIENCE

- Internship at **Toyota Technological Institute, Chicago, USA**   **Summer '13**
  Mentor: Prof. Julia Chuzhoy
- Research Visit to **University of Bergen, Norway**   **Aug '12**
  Host: Prof. Fedor Fomin
- Research Visit to **MTA SZTAKI, Hungary**   **Jun - Jul '12**
  Host: Prof. Dániel Marx
- Internship at **Institute of Mathematical Sciences, India**   **Summer '10**
  Mentor: Prof. Saket Saurabh
- Internship at **Indian Institute of Science, India**   **Summer '09**
  Mentor: Prof. Sunil Chandran

COLLABORATORS

Abhijin Adiga, Sandip Banerjee, Sujoy Bhore, L. Sunil Chandran, Graham Cormode, Marek Cygan, Laszlo Egri, Hossein Esfandiari, Andreas Emil Feldmann, Fedor V. Fomin, Petr A. Golovach, MohammadTaghi Hajiaghayi, Lior Kamma, Jonathan Katz, Rohit Khandekar, Guy Kortsarz, Robert Krauthgamer, Ramanjit Kumar, Vahid Liaghat, Daniel Lokshtanov, Pasin Manurangsi, Dániel Marx, Andrew McGregor, Pranabendu Misra, Morteza Monemizadeh, Koyel Mukherjee, Marcin Pilipczuk, Michał Pilipczuk, M.S. Ramanujan, Saket Saurabh, Saeed Seddighin, Nimrod Talmon, Sofya Vorotnikova.

SELECTED TALKS

Parameterized and Promised Streaming Algorithms

- Theory Seminar at Charles University, Prague - May '17

- Highlights of Algorithms at Paris, France - June '16

- Department Retreat at Eilat, Israel - April '16

- Theory Seminar at Ben-Gurion University of the Negev, Israel - November '15

- Chennai Mathematical Institute, India - January '15

Fixed-Parameter and Approximation Algorithms: A New Look

- CATS Seminar at University of Maryland, USA - March '13

- Dagstuhl Seminar 13121, Germany - March '13

- IPEC at Sophia Antipolis, France - September '13

- Weizmann Theory Lunch, Israel - November '14

Fixed-Parameter Tractability of Directed Multiway Cut Parameterized by Size of the Cutset

- CATS Seminar at University of Maryland, USA - Dec '11

- Institute of Mathematical Sciences, India - January '12

- SODA at Kyoto, Japan - January '12

- University of Bergen, Norway - August '12

PROFESSIONAL SERVICE

- **Program Committee:** SPAA '17, COCOON '17, COCOA '17, COCOON '18

- **Reviewer for Conferences:** FOCS, STOC, SODA, ICALP, STACS, ESA, IPEC, FSTTCS, SPAA, WG, WINE, SWAT, COCOON, COCOA, LATIN, WALCOM, SOFSEM.

- **Reviewer for Journals:** Journal of the ACM (JACM), SIAM Journal on Computing (SICOMP), ACM Transactions on Algorithms (TALG), Journal of Computer and System Sciences (JCSS), Algorithmica, SIAM Journal on Discrete Mathematics (SIDMA), Combinatorica, ACM Transactions on Computation Theory (TOCT), Theoretical Computer Science (TCS), Networks, Theory of Computing Systems (TOCS), Discrete Applied Mathematics (DAM), Journal of Discrete Algorithms, Information and Computation.

- Co-organized International Mathematics Competition (IMC) problem-solving seminar at University of Warwick (Jan-March '18)

- Member of Admissions Committee at Department of Computer Science, University of Maryland for Fall '13 and Fall '14 applicants.