PRAFULLKUMAR TALE

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Fields of Interests

Parameterized Complexity, Exact Exponential Algorithms, Graph Algorithms, Graph Theory and Algorithmic Engineering.

Work Experiences

CISPA Helmholtz Center for Information Security, Saarbrücken, Germany July 2020 – present
Position: Post-Doctoral Fellow

Max-Planck Institute for Informatics (MPII), Saarbrücken, Germany March 2020 – June 2020
Position: Post-Doctoral Fellow

University Of Bergen, Bergen, Norway Jan 2019 – June 2019
Position: Researcher (An internship during my Ph.D.)

Ebay/PayPal Pvt Ltd June 2012 – July 2013
Position: Software Engineer

Education

The Institute of Mathematical Sciences (IMSc), HBNI, Chennai Aug 2015 – Feb 2020
Ph.D. in Theoretical Computer Sciences

The Institute of Mathematical Sciences (IMSc), HBNI, Chennai Aug 2013 – Aug 2015
Master of Science in Theoretical Computer Sciences

Indian Institute of Technology (IIT), Roorkee July 2007 – May 2012
Master of Science in Applied Mathematics (Five year Integrated Degree Program)

Academic Achievements and Scholarships

Best Student Paper Award at IPEC 2016
Awarded Best Student Paper Award for our paper titled 'Dynamic Parameterized Problems' at International Symposium on Parameterized and Exact Computation, IPEC 2016.

National Board for Higher Mathematics (NBHM) 2010 *(Declined)*
Selected for M.A./M.Sc. scholarship conducted by NBHM and funded by Department of Atomic Energy, Govt of India. Only twenty two students throughout the nation were selected in that year.

Innovation in Science Pursuit for Inspired Research (INSPIRE) 2008 *(Declined)*
Awarded Innovation in Science Pursuit for Inspired Research (INSPIRE) scholarship by the Department of Science and Technology, Govt of India for perusing basic science in Indian Institute of Technology.

Kishore Vaigyanik Protsahan Yojana (KVPY) 2008 to 2012
Recipient of Kishore Vaigyanik Protsahan Yojana scholarship awarded by Department of Science and Technology, Govt of India in the year 2007. It is the highest paid scholarship at the graduate level.

Merit-cum-means Scholarships (MCM) 2007 to 2008
Awarded merit-cum-means scholarships by Indian Institute of Technology for being second in the Mathematics department in the academic year 2007.

IIT Joint Entrance Examination – 2007
Secured All India Rank 3289 in IIT-JEE and 3524 in AIEEE. (Among top 1 % students in the nation.)

National Talent Search Examination (NTSE) 2005 to 2007
Awarded with National Talent Search Examination in the year 2005. This scholarship is given to top 750 students in India.

Physics Olympiad – 2006
In the top 1 % (out of 42000 students) at the National level in the Physics Olympiad conducted by Indian Association of Physics Teachers (IAPT).

Journal Publications (along with their conference versions)

(*J*-11) **On the Parameterized Complexity of Grid Contraction**
- *Co-authors* : Saket Saurabh, Ueverton Dos Santos Souza
- *Journal* : (To appear) Journal of Computer and System Sciences (**JCSS**) (2022)
- *Conference* : 17^{th} Scandinavian Symposium and Workshops on Algorithm Theory, **SWAT** 2020

(*J*-10) **On the Parameterized Complexity of Maximum Degree Contraction.**
- *Co-author* : Saket Saurabh
- *Journal* : Algorithmica, Volume 84: 405 – 435 (2022)
- *Conference* : A preliminary version in International Symposium on Parameterized And Exact Computation **IPEC** 2020

(*J*-9) **Sparsification Lower Bound for Linear Spanners in Directed Graphs.**
- *Co-author* : – none –
- *Journal* : Theoretical Computer Science, Volume 898 : 69 – 74 (2022)
- *Conference* : – none –

(*J*-8) **On the Parameterized Approximability of Contraction to Classes of Chordal Graphs**
- *Co-authors* : Spoorthy Gunda, Pallavi Jain, Daniel Lokshtanov, Saket Saurabh
- *Journal* : ACM Transactions on Computation Theory 13(4) : 27 : 1 – 27 : 40 (2021)
- *Conference* : A preliminary version in Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques, **APPROX/RANDOM** 2020

(*J*-7) **Paths to Trees and Cacti**
- *Co-authors* : Akanksha Agrawal, Lawqueen Kanesh, Saket Saurabh
- *Journal* : Theoretical Computer Science, Volume 860 : 98 – 116 (2021)
- *Conference* : A preliminary version in 10^{th} International Conference on Algorithms and Complexity, **CIAC** 2017.

(*J*-6) **Parameterized and Exact Algorithms for Class Domination Coloring**
Co-authors : R. Krithika, Ashutosh Rai, Saket Saurabh
Journal : Discrete Applied Mathematics (**DAM**), Volume 291 : 286 – 299 (2021)
Conference : A preliminary version in **SOFSEM** 2017: Theory and Practice of Computer Science.

(*J*-5) **Path Contraction Faster than 2^n**
Co-authors : Akanksha Agrawal, Fedor Fomin, Daniel Lokshtanov, Saket Saurabh
Journal : SIAM Journal on Discrete Mathematics (**SIDMA**), 34(2) : 1302 – 1325 (2020)
Conference : A preliminary version in 46^{th} International Colloquium on Automata, Languages and Programming, **ICALP** 2019.

(*J*-4) **Subset Feedback Vertex Set in Chordal and Split Graphs.**
Co-authors : Geevarghese Philip, Varun Rajan, Saket Saurabh
Journal : Algorithmica, Volume 81 (9) : 3586 – 3629 (2019)
Conference : A preliminary version in 11^{th} International Conference on Algorithms and Complexity, **CIAC** 2019.

(*J*-3) **On the Parameterized Complexity of Contraction to Generalization of Trees.**
Co-authors : Akanksha Agarwal, Saket Saurabh
Journal : Theory of Computing Systems, Volume 63 (3) : 587 – 614 (2019)
Conference : A preliminary version in International Symposium on Parameterized and Exact Computation, **IPEC** 2017.

(*J*-2) **Harmonious Coloring : Parameterized Algorithms and Upper Bounds.**
Co-authors : Sudeshna Kolay, Ragukumar Pandurangan, Fahad Panolan, Venkatesh Raman
Journal : Theoretical Computer Science, Volume 772 : 132 – 142 (2019)
Conference : A preliminary version in Graph-Theoretic Concepts in Computer Science, **WG** 2016.

(*J*-1) **Dynamic Parameterized Problems.**
Co-authors : R. Krithika, Abhishek Sahu
Journal : Algorithmica, Volume 80(9) : 2637 – 2655 (2018)
Conference : A preliminary version in International Symposium on Parameterized and Exact Computation, **IPEC** 2016.

Conference Publications (that do not have a journal version yet)

(*C*-7) **The Complexity of Contracting Bipartite Graphs into Small Cycles**
Co-authors : R. Krithika, Roohani Sharma
Conference : (To appear) Graph-Theoretic Concepts in Computer Science, **WG** 2022

(*C*-6) **Parameterized Complexity of Weighted Multicut in Trees**
Co-authors : Esther Galby, Dániel Marx, Philipp Schepper, Roohani Sharma
Conference : (To appear) Graph-Theoretic Concepts in Computer Science, **WG** 2022

(*C*-5) **A Framework for Parameterized Subexponential Algorithms for Generalized Cycle Hitting Problems on Planar Graphs**
Co-authors : Dániel Marx, Pranabendu Misra, Daniel Neuen
Conference : ACM-SIAM Symposium on Discrete Algorithms (**SODA** 2022)

(*C*-4) **Parameterized Complexity of Maximum Edge-Colorable Subgraph**
Co-authors : Akanksha Agrawal, Madhumita Kundu, Abhishek Sahu, Saket Saurabh
Conference : Annual International Computing and Combinatorics Conference, **COCOON** 2020

(*C*-3) **An FPT Algorithm for Contraction to Cactus**
Co-authors : R. Krithika, Pranabendu Misra
Conference : Annual International Computing and Combinatorics Conference, **COCOON** 2018

(*C*-2) **Exact and Parameterized Algorithms for (k, i)-Coloring**
Co-authors : Diptapriyo Majumdar, Rian Neogi, Venkatesh Raman
Conference : Algorithms and Discrete Applied Mathematics, 3^{rd} International Conference, **CALDAM** 2017

(*C*-1) **Lossy Kernels for Graph Contraction Problems**
Co-authors : R. Krithika, Pranabendu Misra, Ashutosh Rai
Conference : Foundations of Software Technology and Theoretical Computer Science, **FSTTCS** 2016

Reviewer for

Journals: Algorithmica (2022), TCS (2021), JCSS (2021)×2, DAM (2021), DMTCS (2021), JCSS (2020)×2, TCS (2019)×2, and Algorithmica (2018).

Conferences: ESA(2022) ×2, WG(2022) ×2, ISAAC (2021), WG (2021), ISAAC (2020), COCOON (2020), ESA (2020), ICALP (2020), STACS (2020), ESA (2019), IPEC (2018), COCOON (2018), IPEC (2017), and IPEC (2016).

Research Visits

University of Bergen, Bergen, Norway — May 2017 – July 2017

University of Bergen, Bergen, Norway — Sep 2016 – Nov 2016

Max-Planck Institute for Informatics (MPII), Saarbrücken, Germany — June 2015 – July 2015

Invited Talks

(*T*2) **Parameterized Complexity 301**:
Title : Graph Contraction: Old and New Developments
Date : 31^{st} December 2020

(*T*1) **Parameterized Complexity Seminar**:
Title : On the Parameterized Approximability of Contraction to Classes of Chordal Graphs
Date : 24^{th} November 2020

Teaching Experience

Teaching Assistant to the course *Parameterized Algorithm* by Prof. Saket Saurabh during Jan-May 2016 at The Institute Of Mathematical Sciences, Chennai.

Instructor for five workshops on *Introduction to MATLAB*. Each workshop was held at Institute Computer Centre, IIT Roorkee for two hours daily spread over three days and has participation of more than 60 students.

Programming Experience

Lossy Kernelization in Practice Jan 2019 – June 2019
We posit that carefully crafted lossy reduction rule can yield improved approximation solution in practice. I have implemented (in C++ and CPLEX) different algorithms to solve Dominating Set on sparse graphs for various benchmark instances to support our hypothesis.

The Parameterized Algorithms and Computational Experiments Challenge (PACE)
Implemented various algorithms to solve the following problems on large graphs: Vertex Cover using C++ (in 2019), Steiner Tree using C++ (in 2018), and Minimum Fill-In using Python (in 2017).

SymPy – Open Source Project March 2011 – May 2012
One of the authors of SymPy, an open source Python library for symbolic mathematics. I have contributed to its development by submitting functions, reviewing pull request, fixing patches.

Conferences and Workshops Attended

IPEC 2020 December 14 – 18, 2020
(Virtually) Attended 15^{th} International Symposium on Parameterized and Exact Computation, and presented our work.

SWAT 2020 June 22 – 24, 2020
(Virtually) Attended 17^{th} Scandinavian Symposium and Workshops on Algorithm Theory, and presented our work.

Algorithmic Tractability via Sparsifiers August 9 – 12, 2019
Attended workshop on tools used to sparsify the instances of hard problems that arise algorithmically. This workshop was organized at Leh, India and supported by the ERC Grant LOPRE and the Institute of Mathematical Sciences.

WorKer 2019 June 3 – 7, 2019
Attended workshop on Kernelization organized by University of Bergen (UiB) at UiB, Norway.

CIAC 2017 May 24 – 26, 2017
Attended Algorithms and Complexity - 10^{th} International Conference, CIAC 2017 in Athens, Greece and presented our work.

Rangoli Of Algorithms (RoA) and FSTTCS 2016 December 11 – 12, 2016
Attended RoA as a part of IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science organized at Chennai Mathematical Institute, India.

CTD 2016 April 28 – 29, 2016
Attended Chennai Theory Day organized by Chennai Mathematical Institute and presented research work on various graph coloring.

WorKer 2015 June 1 – 4, 2015
Attended workshop on Kernelization organized by University of Bergen at Sophus Lie Conference Center, Norway.

FSTTCS 2014 December 15 – 17, 2014
Attended IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science organized at India International Centre, New Delhi.

Advanced School on Parameterized Algorithms & Kernelization (ASPAK) Mar 3 – 8, 2014
This school was focused on several recent advances in parameterized algorithms and kernelization. It covered many fundamental as well as few advanced techniques.

Workshop on Social Networks Feb 20 – 24, 2012
Attended the workshop jointly organized by IIT–Madras, IMSc and IMI Chennai. Many prominent speakers from diversified areas such as Computer Science, Mathematics, Physics, History and Social Studies delivered lectures regarding growth and effect of social networks.

National Workshop on Computer Algebra System (CAS) Jan 27 – 31, 2011
Attended the workshop hosted by Bhaskaracharya Pratishthana, Pune as a crash course for following mathematical software - GAP, Pari-GP, SAGE & Maxima.

SciPy.in 2010 Dec 13 – 18, 2010
Participated in an International Conference on Python for education and scientific computing hosted by FOSSEE at IIIT-Hyderabad, ISB and Mahindra Satyam. Contributed to the function "Parametric_plot" to matplotlib during sprint sessions.

Sage Days 25, India Aug 9 – 13, 2010
Participated in an international conference on the open source mathematical software SAGE hosted by FOSSEE at IIT Bombay. Contributed to the 'Textbook Completion' project during sprint sessions.

References

Prof. Saket Saurabh
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Prof. Geevarghese Philip
Chennai Mathematical Institute, Chennai, India
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