Akash Kumar

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(Last Update: November 13, 2020) https://akashkumar-d.github.io/

Research Interests

Learning Theory, Theoretical Computer Science, Machine Learning, Large-scale Optimization, Differential Geometry

Education

Sept. 2018 – Aug. 2019 **Ph.D Student in Computer Science**, *Aalto University*, Espoo, Finland
Research topic: Adversarial Deep Learning and Non-convex Optimization

2016 – 18 **MSc. in Computer Science**, *Chennai Mathematical Institute*, India
Master's Thesis: Escaping Saddle Points and Tensor Decomposition

2013 – 16 **BSc. in Mathematics and Computer Science**, *Chennai Mathematical Institute*, India

Work Experience

Sept 2019 – Now **Max Planck Institute for Software Systems**, *Research Fellow*, Saarbrücken, Saarland, Germany.
Project: Machine Teaching: Teaching Complexity, Multi-Agent Reinforcement Learning

May – July 2017 **IBM India Research Lab**, *Research Intern*, Bengaluru, Karnataka, India.
Project: Tabular Data Summarization

May – July 2015 **Indian Institute of Technology**, *Intern*, Kanpur, UP, India.
Project: Circuit Complexity

May – July 2014 **Indian Institute of Technology**, *Intern*, New Delhi, Delhi, India.
Project: Graceful Labelling of Complete Graphs

Selected Publications

P1 **Akash Kumar**, Hanqi Zhang, Adish Singla, and Yuxin Chen. 2020. Average-case Complexity of Teaching Convex Polytopes via Halfspace Queries. In submission: The 32nd International Conference on Algorithmic Learning Theory (ALT'21).

P2 **Akash Kumar**, Adish Singla, Yisong Yue, and Yuxin Chen. 2020. The Teaching Dimension of Kernel Perceptrons. In submission: The 24th International Conference on Artificial Intelligence and Statistics (AISTATS'21), 2021.

P3 **Akash Kumar** and Mithilesh Kumar. 2020. Deletion to Induced Matching In preparation for a conference submission.

Selected Awards and Honors

2019– Max Planck Institute Fellowship

2016-18 Chennai Mathematical Institute Merit Based Stipend to Masters Student

2016 Summer School With Full Scholarship at Institute of Mathematical Sciences (Chennai, India)

2013-16 Chennai Mathematical Institute Merit Based Stipend to Bachelors Student

2011-12 Awarded Merit Certificate and Gold medal for qualifying for Indian National Mathematics Olympiad sponsored by National Board For Higher Mathematics, Department of Atomic Energy, Govt. Of India.

2011 Special Merit Certificate: Honoured by CBSE Board, India for outstanding performance in the CBSE Examinations for scoring CGPA 10.

2006-10 Ideal Student Awardee: Awarded Medal of Excellence by Managing Director, SAIL, Steel Plant for topping the class and excelling in extra-curricular activities.

Selected Talks

2018 **Manifold Learning and Tensor Decomposition**, *Chennai Mathematical Institute (India)*

2017–18 **Tabular Data Summarization**, *IBM Reseach Lab (India), Poster Competition (Chennai Mathematical Institute)*

Relevant Coursework

- **Mathematics** Linear Algebra, Probability Theory, Measure Theoretic Probability, Group Theory, Ring Theory, Calculus [1,2,3], Real Analysis, Complex Analysis, Topology, Differential Equations, Statistics, Stochastic Processor, Optimization
- **Computer Science** Design and Analysis of Algorithms, Complexity theory [1,2], Parameterized Algorithms, Arithmetic Circuits, Logic, Game theory, Algorithmic Game Theory, Algebra Computation and Algorithms, Machine Learning, Advanced Machine Learning, Deep Learning, Adversarial Deep Learning, Reinforcement Learning, Policy Gradient Reinforcement Learning, Pseudorandomness

Workshops/Conferences and Summer Schools

2020 **The Cornell, Maryland, Max Planck Pre-doctoral Research School at Max Planck Institute for Software Systems organized *virtually*.**

2020 **NeurIPS'20**

2017 **NMI Workshop on Arithmetic Complexity.**

2017 **CODS organised at Indian Institute of Technology, Madras (India)**

2016 **FSTTCS organised at Chennai Mathematical Institute (India)**

Skills

Programing Python, C, C++, Haskell, Java, R, SQL, Bash

Libraries/Tools Scikit-learn, Pandas, PyTorch, Tensorflow, Git, Numpy, Scipy

Teaching

Spring 2016 **Teaching Assistant**, *Chennai Mathematical Institute*
Discrete Mathematics

Fall 2017 **Teaching Assistant**, *Chennai Mathematical Institute*
Machine Learning and Data Mining

Professional Services

2020 **Reviewer**, *International Conference on Artificial Intelligence and Statistics (AISTATS) '21.*