

# Akash Kumar

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✉ [akumar@mpi-sws.org](mailto:akumar@mpi-sws.org)

📄 <https://akashkumar-d.github.io/>

## Research Interests

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

## Education

- Sept. 2018 – **Ph.D Student in Computer Science**, *Aalto University*, Espoo, Finland  
Aug. 2019 *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 – **Max Planck Institute for Software Systems**, *Research Fellow*, Saarbrücken, Saarland, Germany.  
Now  
Project: Machine Teaching: Teaching Complexity, Multi-Agent Reinforcement Learning
- May – July **IBM India Research Lab**, *Research Intern*, Bengaluru, Karnataka, India.  
2017 Project: Tabular Data Summarization
- May – July **Indian Institute of Technology**, *Intern*, Kanpur, UP, India.  
2015 Project: Circuit Complexity
- May – July **Indian Institute of Technology**, *Intern*, New Delhi, Delhi, India.  
2014 Project: Graceful Labelling of Complete Graphs

## Selected Publications

- P1 **Akash Kumar**, Adish Singla, Yisong Yue, 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**, Hanqi Zhang, Adish Singla, 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 **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)**

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## **Skills**

Programing Python, C, C++, Haskell, Java, R, SQL, Bash  
Libraries/Tools Scikit-learn, Pandas, PyTorch, Tensorflow, Git, Numpy, Scipy

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## **Teaching**

Spring 2016 **Teaching Assistant**, *Chennai Mathematical Institute*  
Discrete Mathematics  
Fall 2017 **Teaching Assistant**, *Chennai Mathematical Institute*  
Machine Learning and Data Mining

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## **Professional Services**

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