Sagnik Mukhopadhyay

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Career Summary

Education

Ph.D. in Computer Science — 2013 - 2017
School of Computer and Systems Sciences, **Tata Institute of Fundamental Research, Mumbai.**
Thesis advised by Prof. Arkadev Chattopadhyay on "Communication Complexity Amplification by Function Composition".

Masters in Computer Science — 2010 - 2013
School of Computer and System Sciences, **Tata Institute of Fundamental Research, Mumbai.**
Thesis advised by Prof. Prahladh Harsha on "A Survey on Uniform Hardness Amplification in NP".

Bachelor of Technology in Computer Science and Engineering — 2006 - 2010
Institute of Engineering & Management, Kolkata.

Employment

Post-doctoral researcher — Jan 2019 - Now
TCS Division, EECS, **KTH Royal Institute of Technology**, Sweden.
Hosted by Prof. Danupon Nanongkai,

Post-doctoral researcher — Sep 2018 - Dec 2018
IÚUK, **Charles University**, Prague.
Hosted by Prof. Michal Koucký,

Post-doctoral researcher — Sep 2017 - Aug 2018
TCS Division, EECS, **KTH Royal Institute of Technology**, Sweden.
Hosted by Prof. Jakob Nordström.

Visits & Talks

ACM Symposium on Theory of Computing (STOC) — 2020
Chicago, Virtual
Talk: Weighted min-Cut: Sequential, cut-query and streaming algorithms.

Highlights of Algorithms (HALG) — 2020
Zürich, Virtual
Talk: Weighted min-Cut: Sequential, cut-query and streaming algorithms.

Shonan Meeting: Distributed Graph Algorithms — 2019
Shonan, Japan
Host: Guy Even & Gregory Schwartzman

IRIF, Université Paris Diderot — 2019
Paris
Host: Sophie Laplante. Visited for 2 weeks.

ACM Symposium on Theory of Computing (STOC) — 2018
Los Angeles

Talk: Simulation beats richness: new data-structure lower bounds.

TCS Division EECS, KTH Royal Institute of Technology 2016
Sweden
Talk: Simulation theorem & fork-lift.

IÚUK, Charles University 2016
Prague
Host: Michal Koucký. Visited for a month.

Workshop on Algorithms in Communication Complexity, Property Testing & Combinatorics 2016
Moscow
Talk: Tribes is hard in message passing model.

Summer School of Lower Bounds 2015
Prague
Host: Michal Koucký.

Indo-UK Workshop on Computational Complexity 2015
Chennai
Talk: Tribes is hard in message passing model.

Conference on Foundations of Software Technology & Theoretical Computer Science (FSTTCS) 2015
Bangalore
Talk: Towards Better Separation between Deterministic and Randomized Query Complexity.

Symposium on Theoretical Aspects of Computer Science (STACS) 2015
Munich
Talk: Tribes is hard in message passing model.

Research

Link to DBLP Profile

Publications

— Preprints —

Faster connectivity in low-rank hypergraphs via expander decomposition. with Calvin Beideman, Karthekeyan Chandrasekaran and Danupon Nanongkai. *2020.*

— Conferences —

Work-optimal parallel minimum cuts for non-sparse graphs. with Andrés López Martínez and Danupon Nanongkai. *Symposium on Parallelism in Algorithms and Architectures* **(SPAA)**, *2021.*

Breaking the quadratic barrier for matroid intersection. with Joakim Blikstad, Jan van den Brand and Danupon Nanongkai. *Symposium on Theory of Computing* **(STOC)**, *2021.*

Distributed weighted min-cut in nearly-optimal time. with Michal Dory, Yuval Efron and Danupon Nanongkai. *Symposium on Theory of Computing* **(STOC)**, *2021.*

Weighted min-cut: Sequential, cut-query and streaming algorithms. with Danupon Nanongkai. *Symposium on Theory of Computing* **(STOC)**, *2020.*

Lifting theorems for Equality. with Bruno Loff. *Symposium on Theoretical Aspects of Computer Science* **(STACS)**, *2019.*

Simulation beats richness: new data-structure lower bounds.. with Arkadev Chattopadhyay, Michal Koucký and Bruno Loff. *Symposium on Theory of Computing* **(STOC)**, *2018.*

Lower bounds for elimination via weak regularity. with Arkadev Chattopadhyay, Pavel Dvorák, Michal Koucký and Bruno Loff. *Symposium on Theoretical Aspects of Computer Science* **(STACS)**, *2017.*

Towards better separation between deterministic and randomized query complexity. with Swagato Sanyal. *Conference on Foundations of Software Technology & Theoretical Computer Science* **(FSTTCS)**, *2015.*

Tribes is hard in message-passing model. with Arkadev Chattopadhyay. *Symposium on Theoretical Aspects of Computer Science* **(STACS)**, *2015.*

— Journals —

Simulation theorems via pseudo-random properties. with Arkadev Chattopadhyay, Michal Koucký and Bruno Loff. *Computational Complexity* **(CC)**, *2019.*

Separation between deterministic and randomized query complexity. with Swagato Sanyal and Jaikumar Radhakrishnan. *SIAM Journal on Computing* **(SICOMP)**, *2018.*

— Thesis —

Communication complexity amplification by function composition.. *Ph.D. Thesis under supervision of Prof. Arkadev Chattopadhyay,* **TIFR, Mumbai.**

A survey on uniform hardness amplification in NP. *MS. Project Report under supervision of Prof. Prahladh Harsha,* **TIFR, Mumbai.**

Reviewing

Conferences (in chronological order): **FSTTCS 2014**, **FOCS 2015**, **STACS 2016**, **CCC 2016**, **CALDAM 2016**, **STOC 2018**, **CCC 2020**, **ICALP 2020**, **RANDOM 2020**, **SOSA 2021**, **SODA 2021**, **STOC 2021**.
Journals: SIAM Journal of Computing, **Journal of Computer & System Science**, **Distributed Computing**.

Teaching

Courses

Advanced algorithm (DD2440 @ KTH) September 2019
co-taught with Danupon Nanongkai. 1.5 lectures, each of 90-minutes duration.

Communication complexity (DD3502 @ KTH) April, 2018
15 lectures, each of 90-minutes duration.

Computational complexity (DD2445 @ KTH) September, 2017
co-taught with Jakob Nordström. 23 lectures, each of 90-minutes duration, out of which 5 were delivered by me.

Communication complexity (@ TIFR) September, 2016
co-taught with Arkadev Chattopadhyay. 27 lectures, each of 90-minutes duration, out of which 2 were delivered by me.

Supervision

Co-supervisor: Mohit Daga (Ph.D.) January 2019 - Now
We are working on distributed graph algorithms. Our main focus is shortest path algorithms.

Co-supervisor: Andrés López Martínez (Masters) October 2019 - September 2020

We worked on parallel graph algorithms in CREW PRAM model. Our main focus was weighted min-cut algorithm. Our result is mentioned in the preprints section.

Pedagogical certification

LH231V: Teaching and Learning in Higher Education September 2020 - January 2021

The aim of the course is to give the students the opportunity to develop their professional role as a teacher in higher education, which includes a scholarly and collegial approach to teaching and learning. This is a mandatory course towards *docent* of KTH faculty hires.

References

Arkadev Chattopadhyay
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